SOUTH ANDROID SURVSTAR

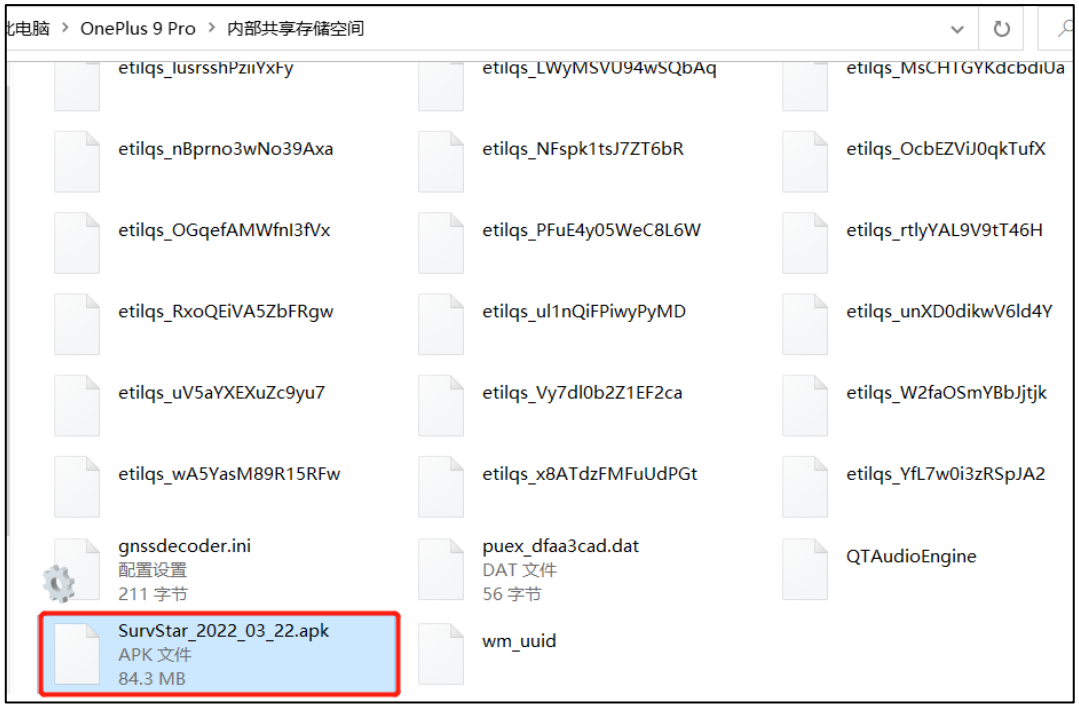
OPERATION GUIDE

Contents

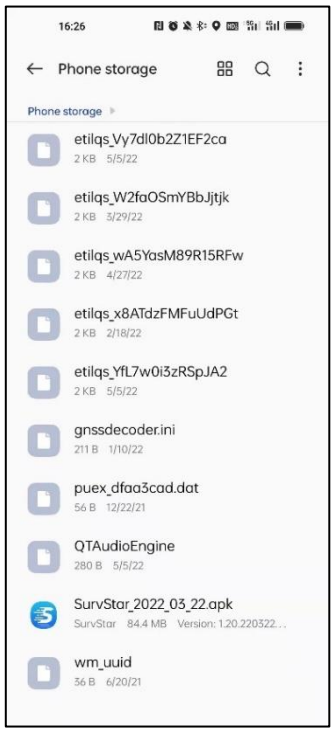
Chapter 1 Installation & Uninstallation

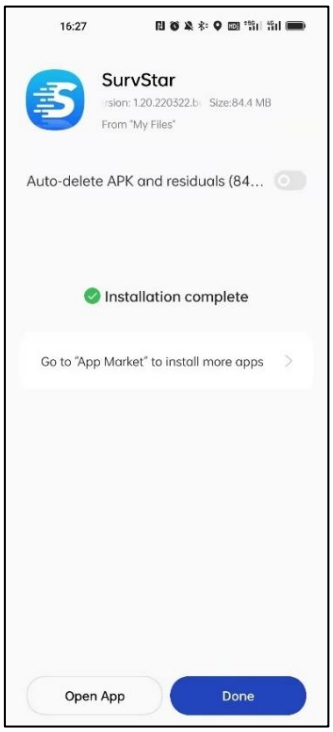
1-1 Installation

1. Copy the APK installation file into android device.



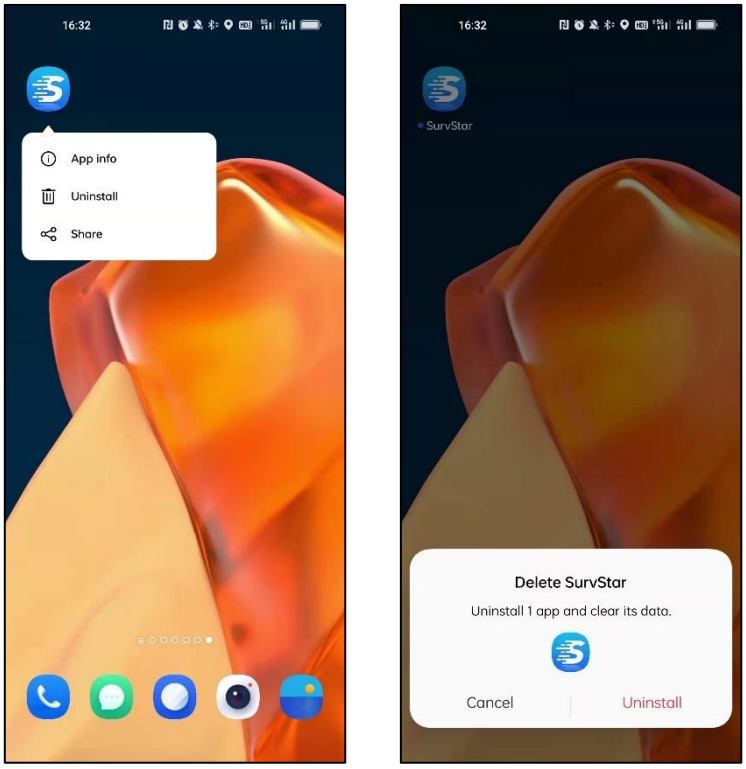
2. Find the APK installation file in android device and click it to start install SurvStar.





1-2 Uninstallation

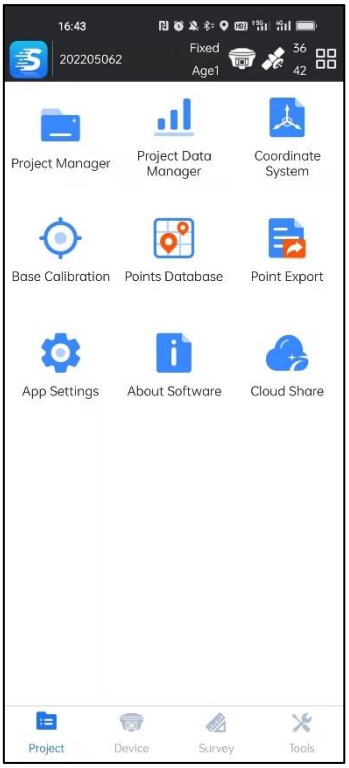
Find the SurvStar icon in android device, and long press it, and then click Uninstall, the system will uninstall it.



Chapter 2 Main Interface

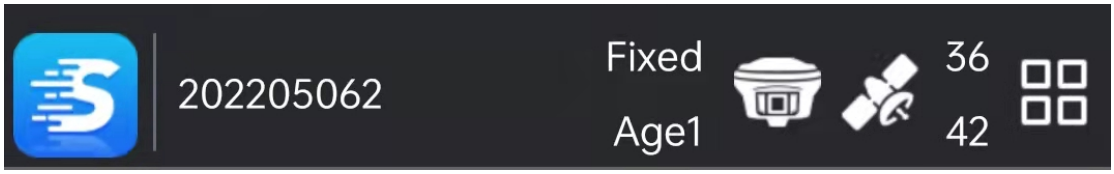
2-1 Introduction

Below is the main interface of SurvStar, it includes: general information at the top, function modules at the bottom and grid function buttons in the middle.

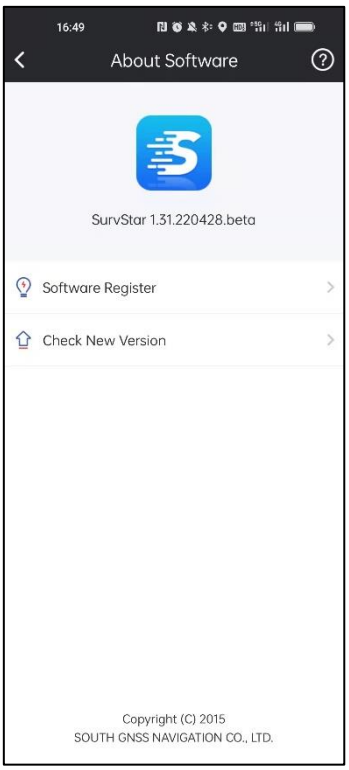


2-2 General Information

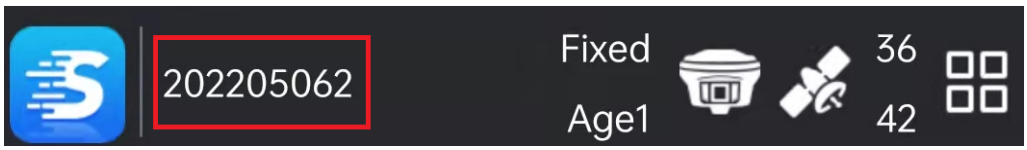
Below is the general information bar, where we can see the current project's name, satellites and coordinates information.



Click  , we will enter to About Software page. In that page, we can check the version of SurvStar, register the SurvStar and check new version.



This is the name of current project.



Solution status: includes Single, Float, Differential and Fixed.

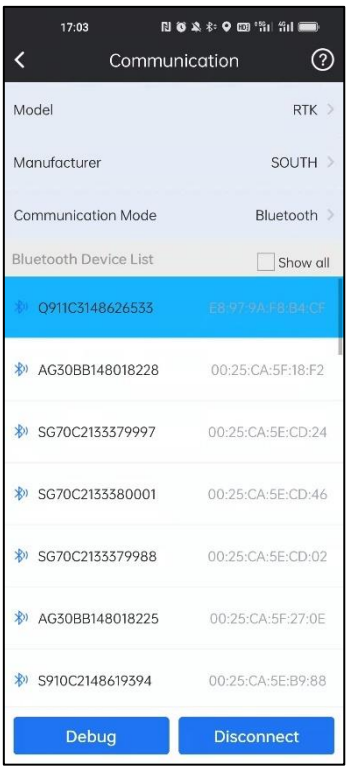
Age1: current differential delay is 1.

e.g., Single, 0, current solution is single, and differential delay is 0.

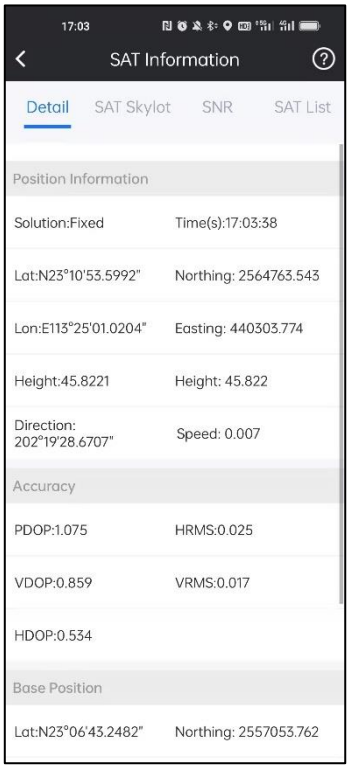
Fixed, 1: current solution is fixed, and differential delay is 1.

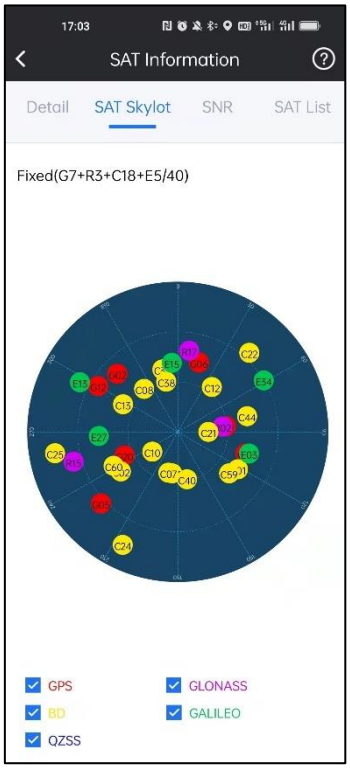
36/42: current number of satellites which used to solution, and the total tracked satellites number.

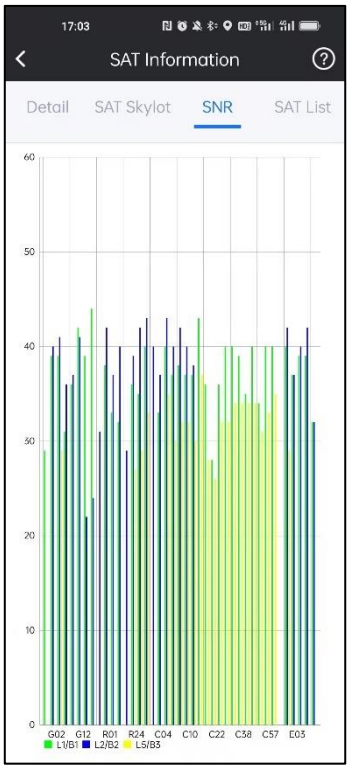
Click  , we will enter to Communication page. In that page, we can search the device and pair with it.

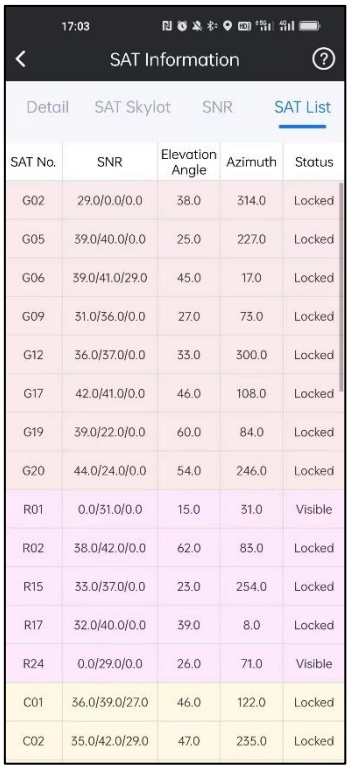


Click  , we will enter to SAT Information page. In that page, we can check the position information, accuracy, base position, SAT skylot, SNR and SAT list.



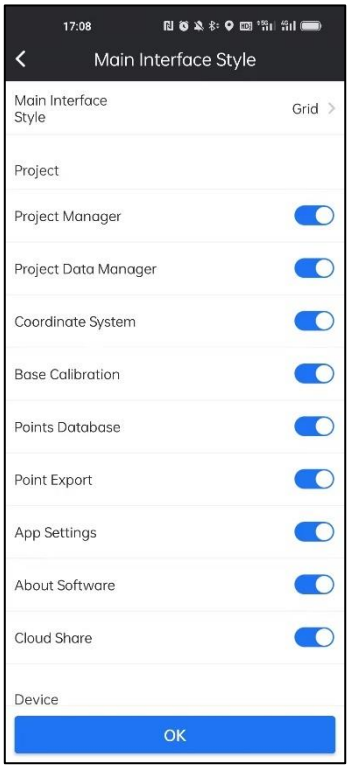


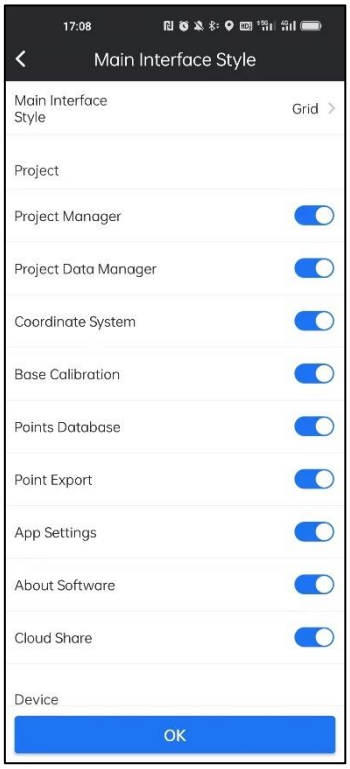


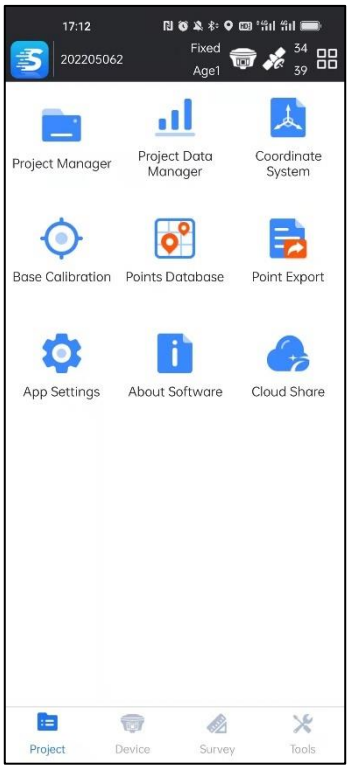


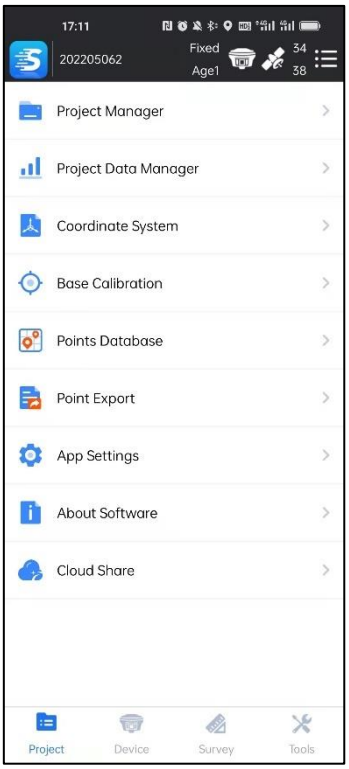
SAT No.	SNR	Elevation Angle	Azimuth	Status
G02	29.0/0.0/0.0	38.0	314.0	Locked
G05	39.0/40.0/0.0	25.0	227.0	Locked
G06	39.0/41.0/29.0	45.0	17.0	Locked
G09	31.0/36.0/0.0	27.0	73.0	Locked
G12	36.0/37.0/0.0	33.0	300.0	Locked
G17	42.0/41.0/0.0	46.0	108.0	Locked
G19	39.0/22.0/0.0	60.0	84.0	Locked
G20	44.0/24.0/0.0	54.0	246.0	Locked
R01	0.0/31.0/0.0	15.0	31.0	Visible
R02	38.0/42.0/0.0	62.0	83.0	Locked
R15	33.0/37.0/0.0	23.0	254.0	Locked
R17	32.0/40.0/0.0	39.0	8.0	Locked
R24	0.0/29.0/0.0	26.0	71.0	Visible
C01	36.0/39.0/27.0	46.0	122.0	Locked
C02	35.0/42.0/29.0	47.0	235.0	Locked

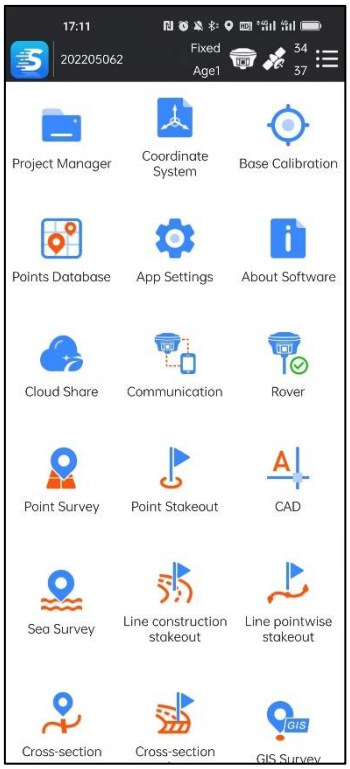
Click  , we will enter to Main Interface Style page. In that page, we can change the main interface style and turn on/off the functions.











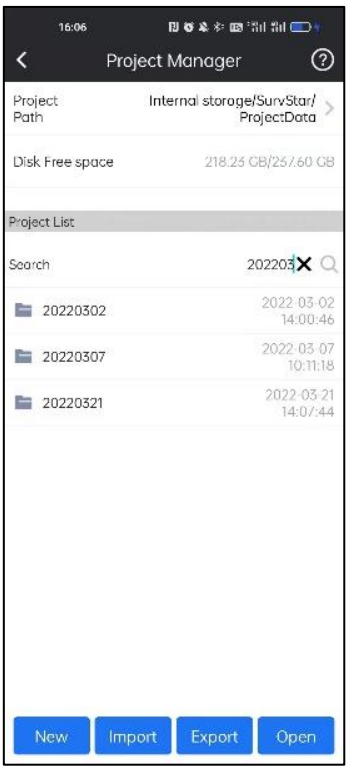
Grid List Simple

Chapter 3 Project

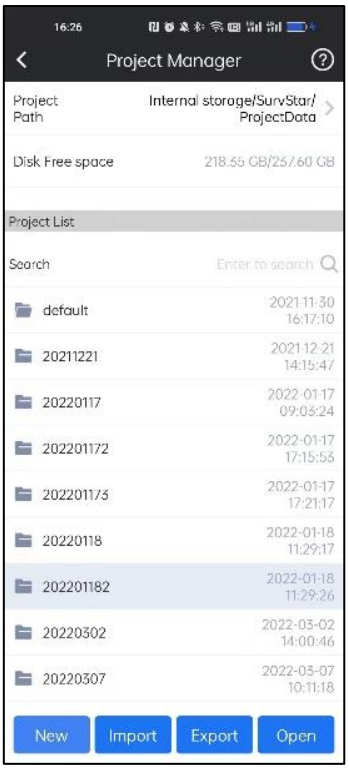
3-1 Project Manager

Search, Open and Delete Project:

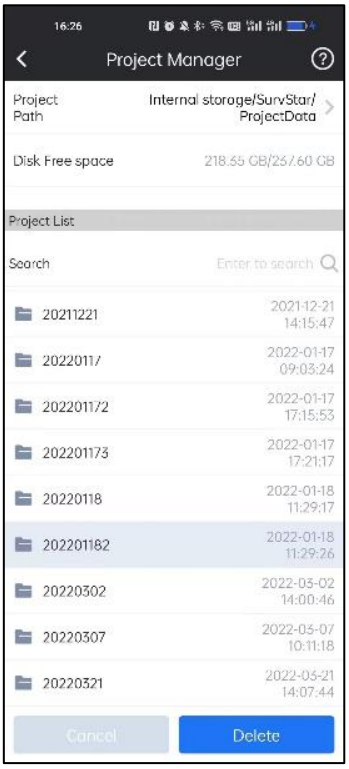
The Project is saved in the default path: Internal storage/SurvStar/ProjectData. There are projects that we created before in Project List. We can search the project in the device by field search.



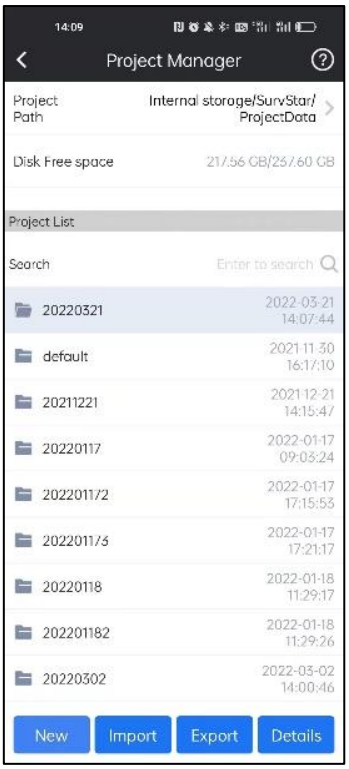
Choose the project we want to open, and Click Open, then the project chosen will be opened.



Hold down the project to be deleted for 1 second, the toolbar below will display the delete button, click Delete, and this project will be delected.

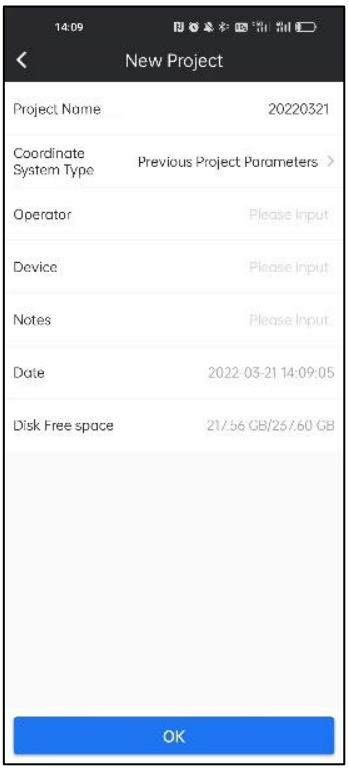


When we use SurvStar for the first time, we need to create a project that including the basic information such as project name, operator and coordinate system type.



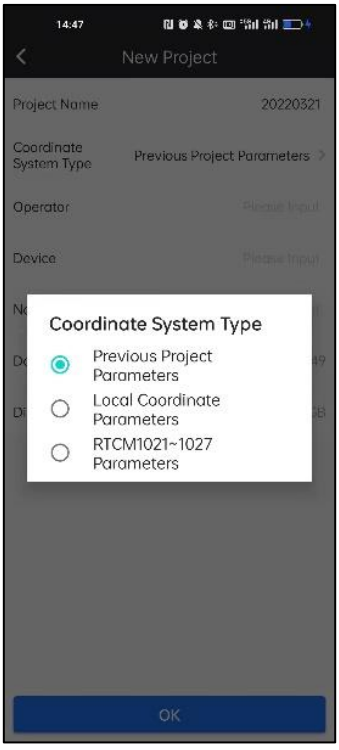
New Project:

1.Click New to the page that can create a new project.

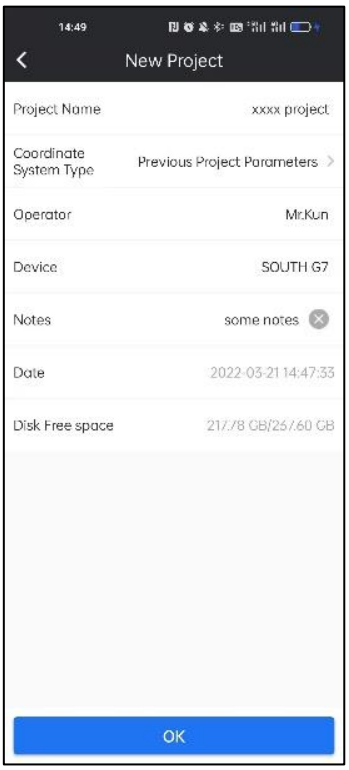


2.Input the Project Name. The default project name is named after the day when the project was created, such as 20220321. This information is necessary. If we forget to input the Project Name, it will show the tips.

3.Choose the coordinate system type. There are three types we can choose: Previous Project Parameters, Local Coordinate Parameters and RTCM1021~1027 Parameters.



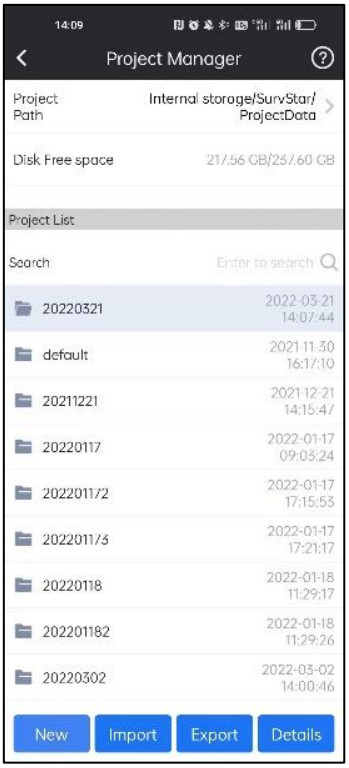
4.Input the other information of the project.



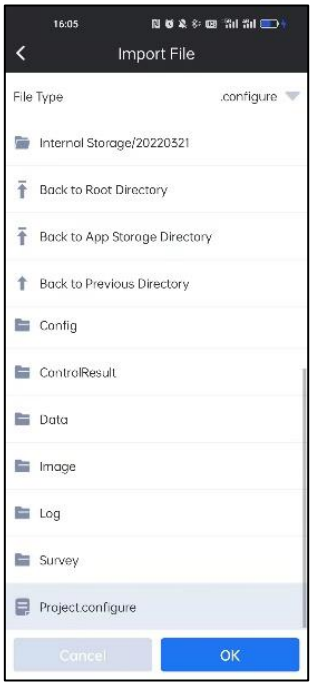
Import Project:

If we have the existing project file (*.configure), we can import that file to apply the information to the current project.

1.Click Import to the page of Import Project.

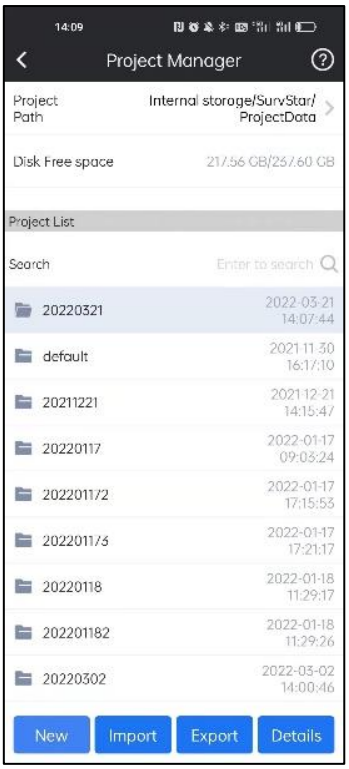


2.Find the project folder and choose the project file (*.configure) saved before, and click OK. Then the project file will be opened.

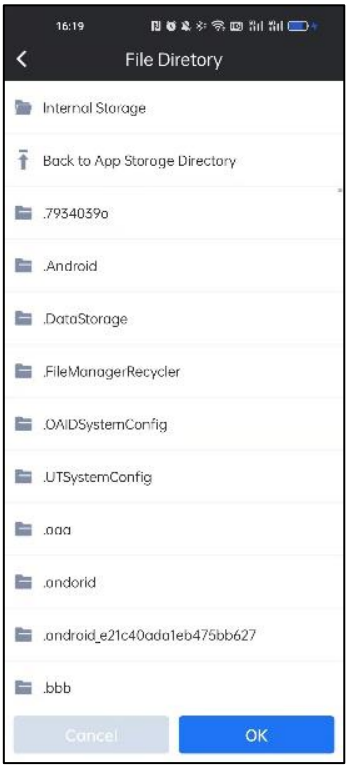


Export Project:

1.Click Export to the page of Export Project.

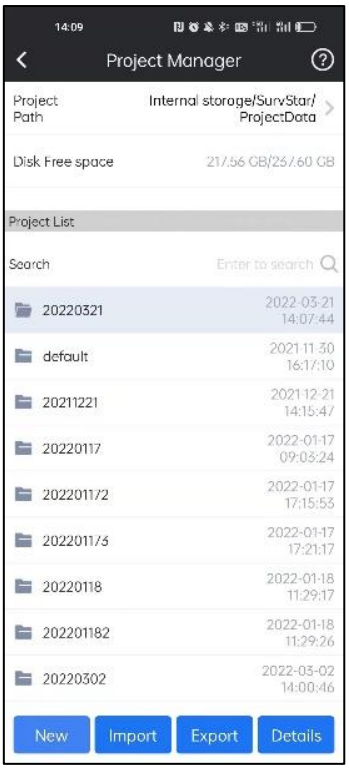


2.Choose the path that we want to save the project file. Click OK. Then the project will be saved.



Project Details:

1.Choose the current project, and Click Details.



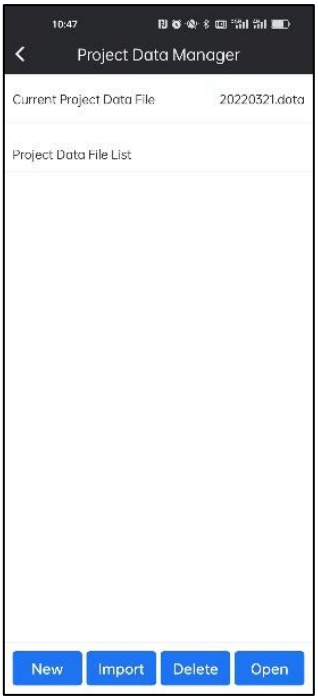
2.We can find the project information, such as Project Name, Coordinate System type and so on.

3-2 Project Data Manager

With that function we can manage the surveyed data. We can create, import, delete and change the surveyed data.

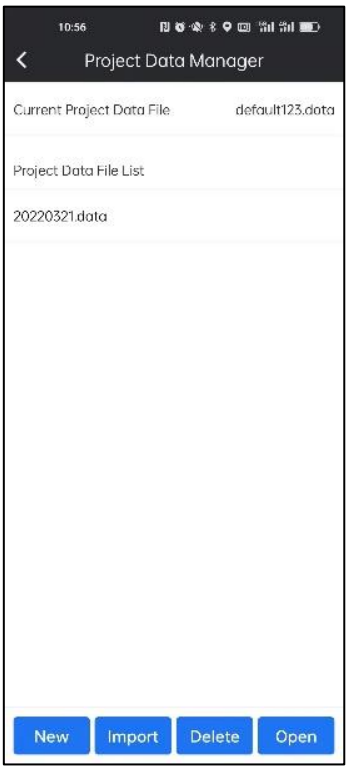
New Project Data:

1.Click New.



2.Input the name of the new project data and click OK.

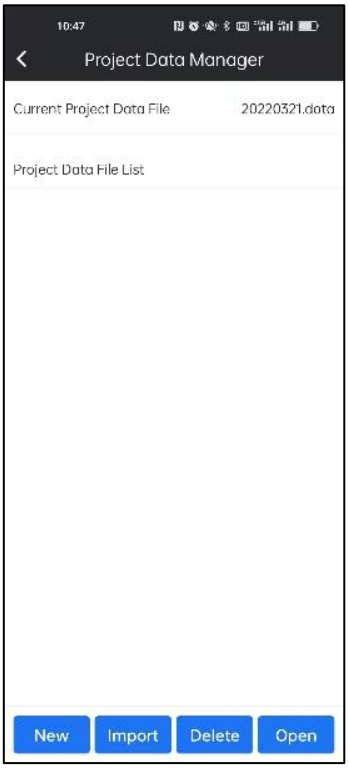
3.The new project data created successfully.



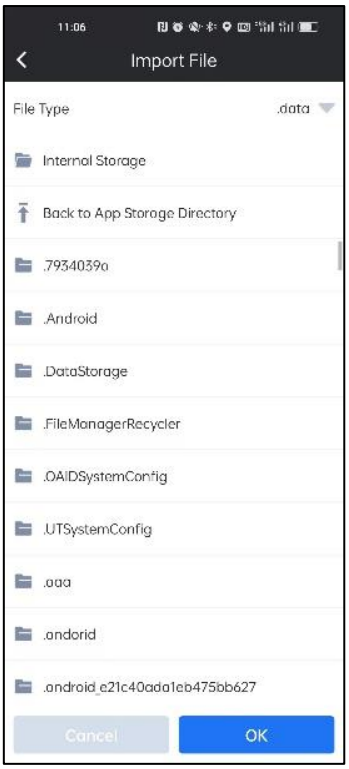
Import Project Data:

We can import the project data from the file (*. data).

1.Click Import.

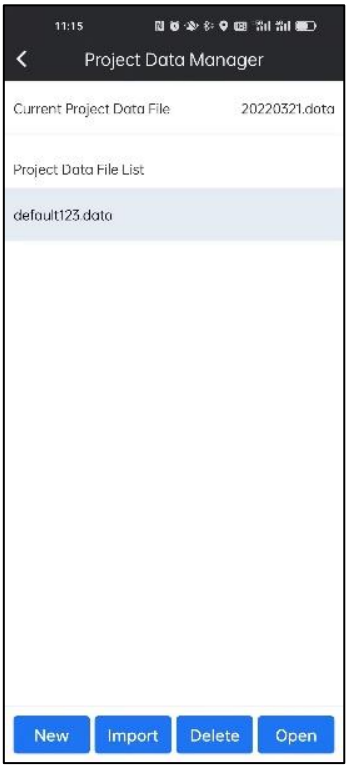


2.Find the correct location of the project data file and choose that file we wanted. Click OK.



Delete Project Data:

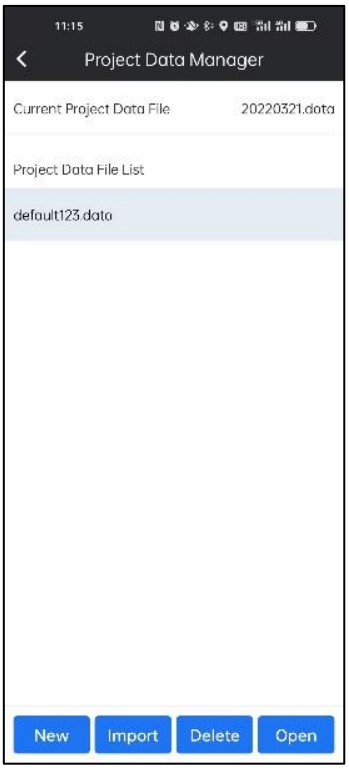
1.Choose the project data we wanted to delete. Then click Delete.



2.Click OK. The project data file will be deleted.

Open Project Data:

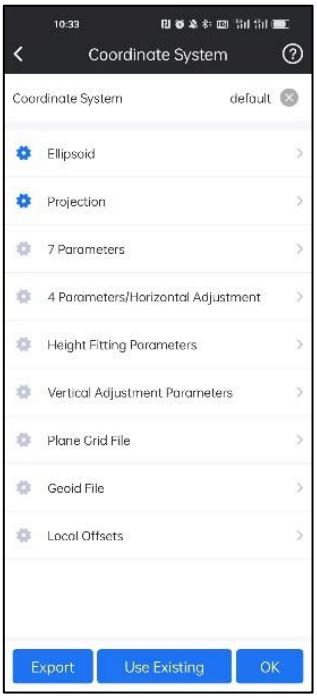
1.Choose the project data we wanted to open. Then click Open.



2.Then the chosen project data is opened.

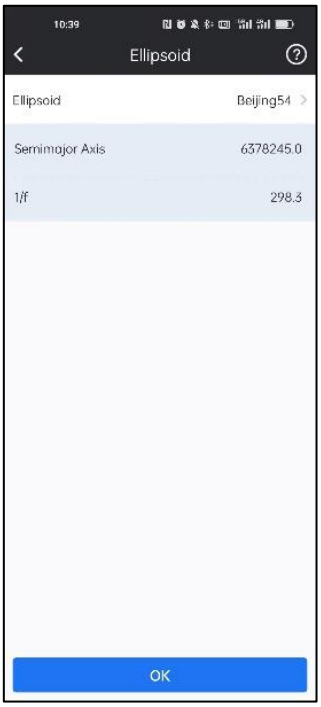
3-3 Coordinate System

By clicking it, we can create new coordinate system by defining the name, ellipsoid, projection, 7 parameters, 4 parameters, height fitting parameters, vertical adjustment parameters, plane grid file, geoid file and local offsets.

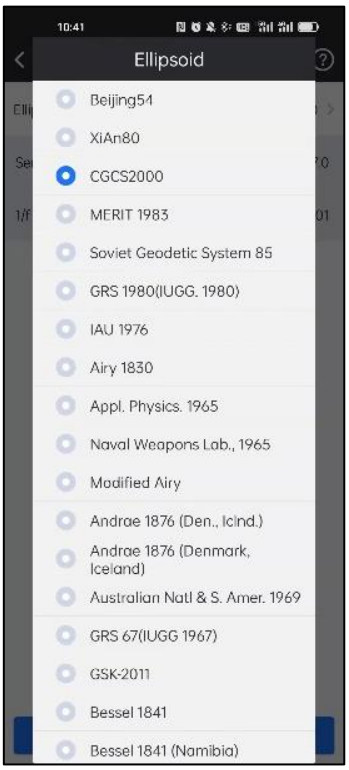


Ellipsoid:

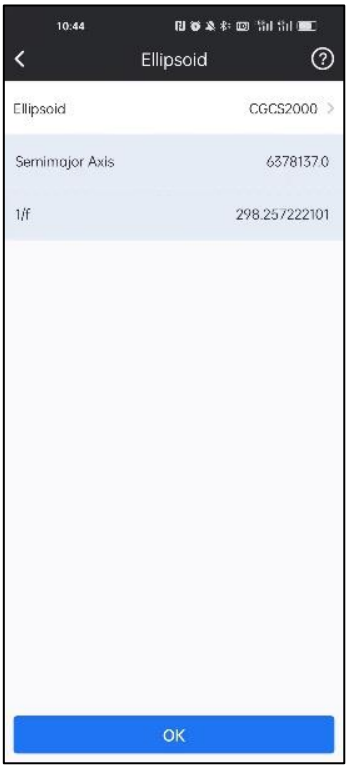
1.Click Ellipsoid, and enter to that page.



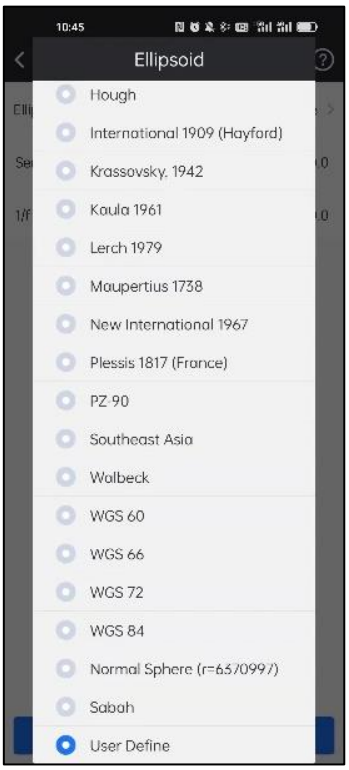
2.Click Ellipsoid and choose the project used one.



3.Click OK. Then the ellipsoid is set successfully.



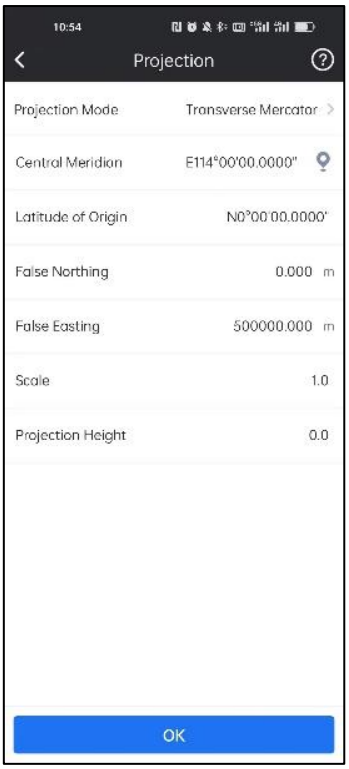
We can define the ellipsoid by choose User Define in the bottom item.



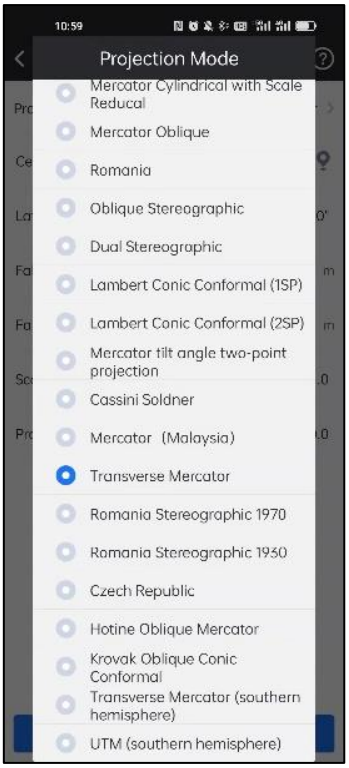
Input the Semimajor Axis and 1/f. Click OK.

Projection:

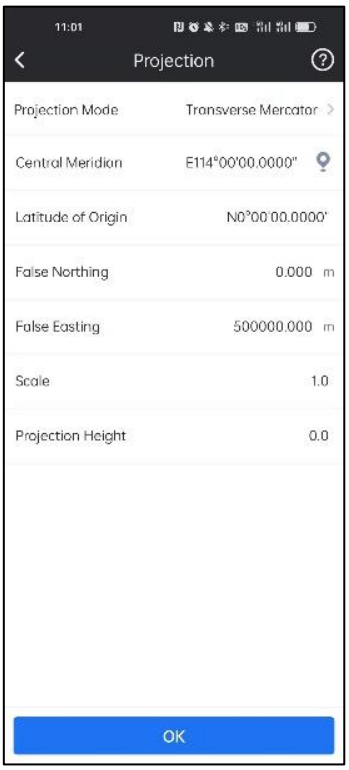
1.Click Projection and enter to that page.



2.Click Projection Mode and choose the project used projection.



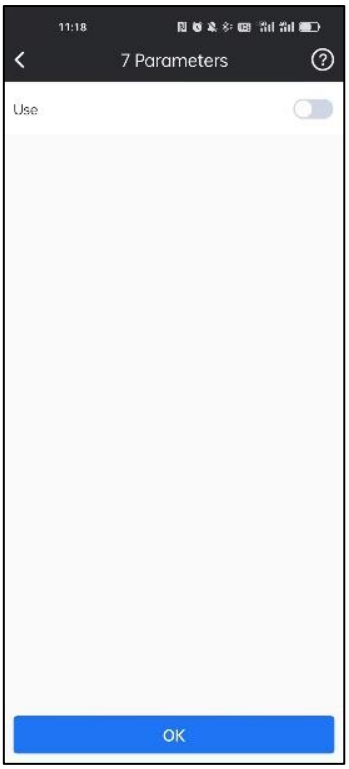
3.Input the projection parameters and click OK. Then the projection is set successfully.



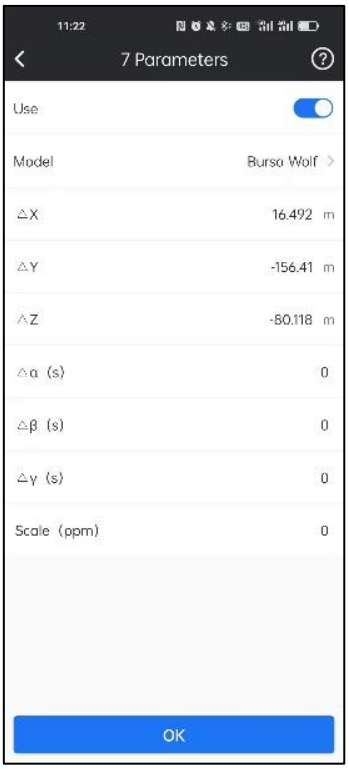
We can click  to set the Central Meridian by the location from the receiver.

7 Parameters:

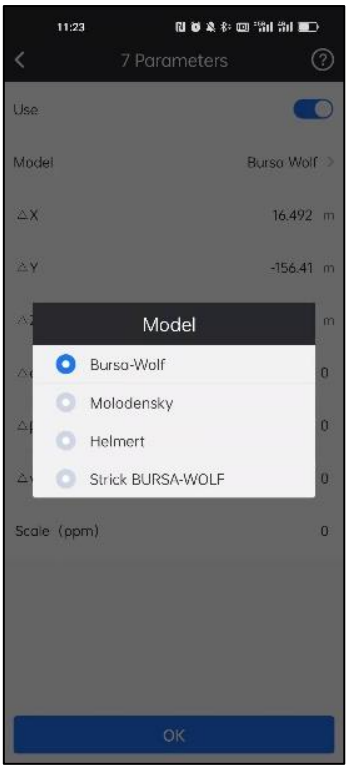
1.Click 7 Parameters and enter to that page.



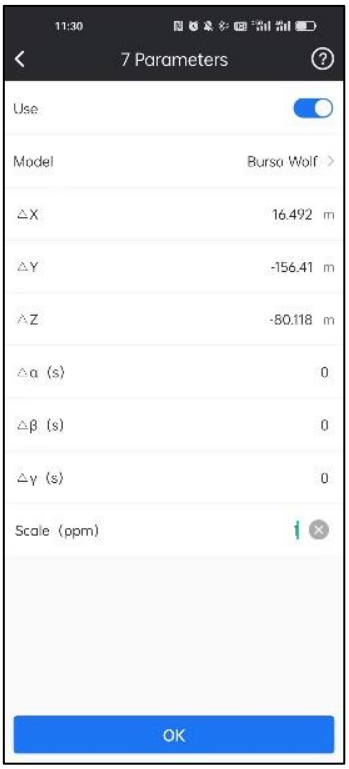
2.Click Use to activate the 7 parameters.



3.Click Model and choose the project used 7 parameters model. We can choose Bursa-Wolf, Molodensky, Helmert and Strick BURSA-WOLF.



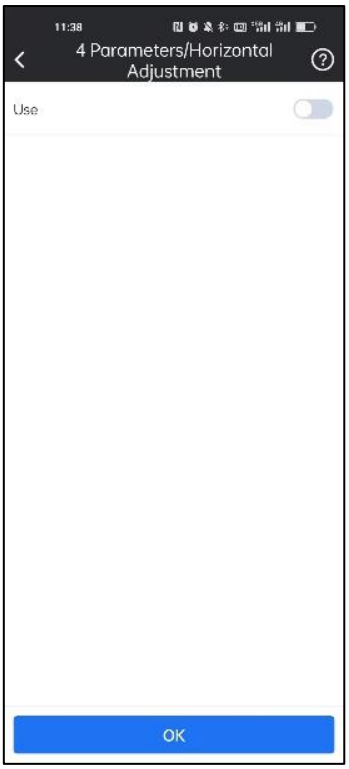
4.Input the 7 parameters and click OK. Then the 7 parameters model is set successfully.



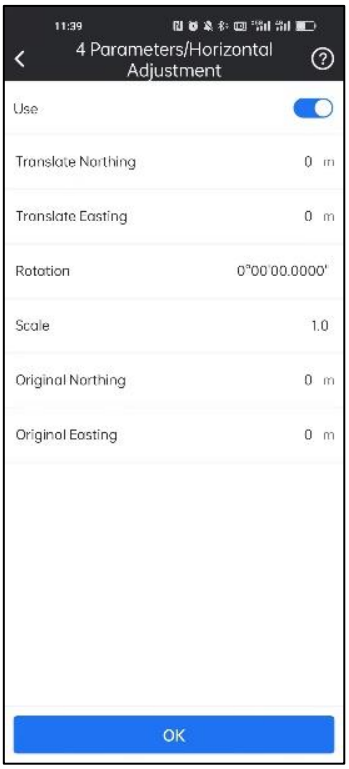
If this function is enabled, the icon in front of it will turn to .

4 Parameters/Horizontal Adjustment:

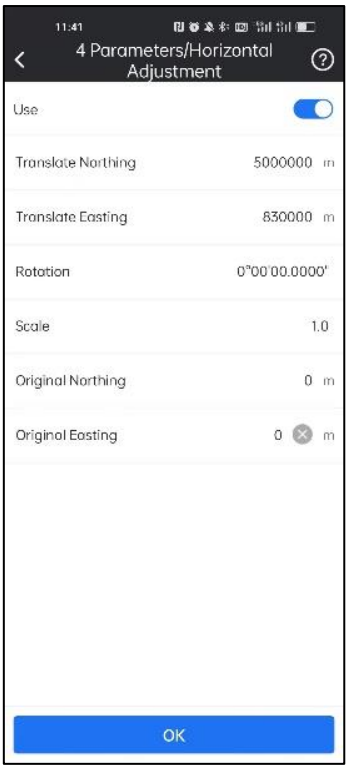
1.Click 4 Parameters/Horizontal Adjustment and enter to that page.



2.Click Use to activate the 4 parameters/Horizontal Adjustment.



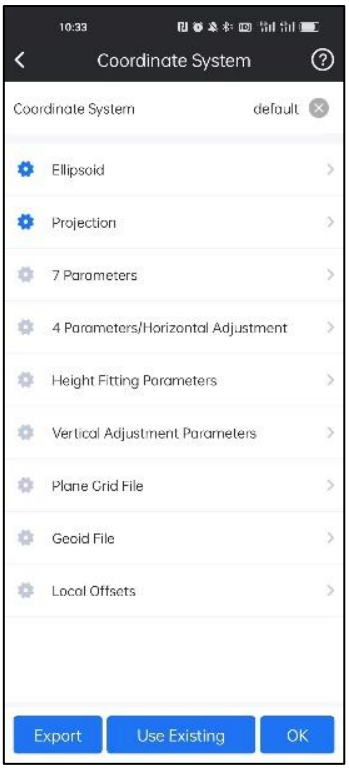
3.Input the 4 parameters/Horizontal Adjustment parameters and click OK. Then the 4 parameters/Horizontal Adjustment is set successfully.



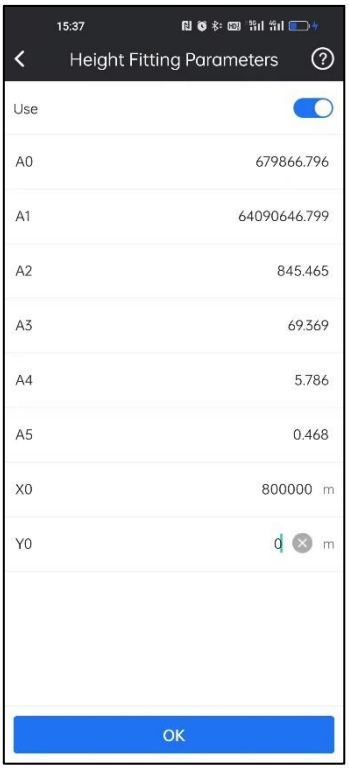
If this function is enabled, the icon  in front of it will turn to  .

Height Fitting Parameters:

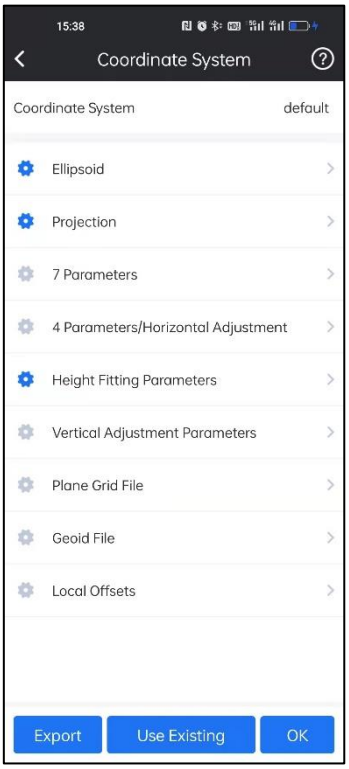
1.Click Height Fitting Parameters.



2.Click Use. And input the height fitting parameters. Click OK.

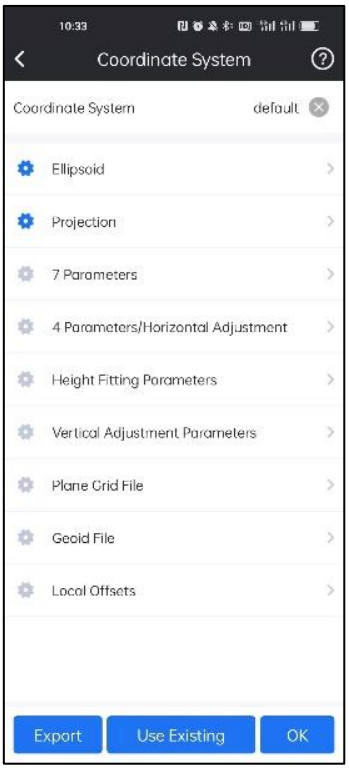


3.Then the height fitting parameters are enabled. The icon in front of it will turn to .

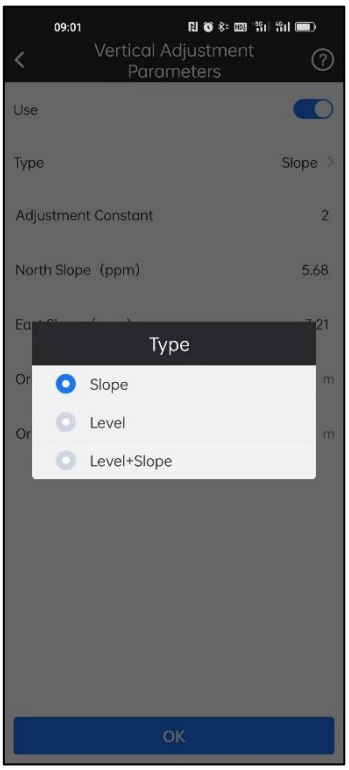


Vertical Adjustment Parameters:

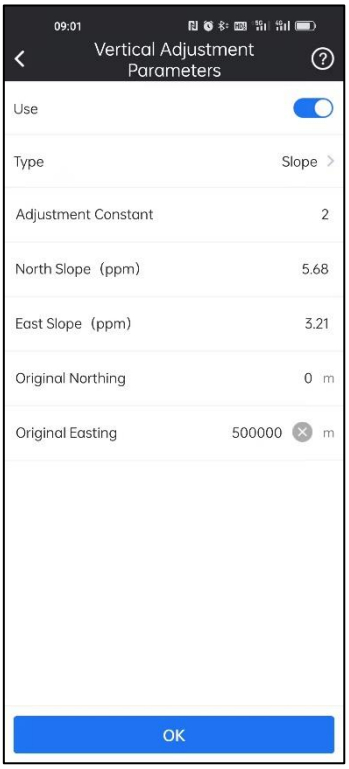
1.Click Vertical Adjustment Parameters.



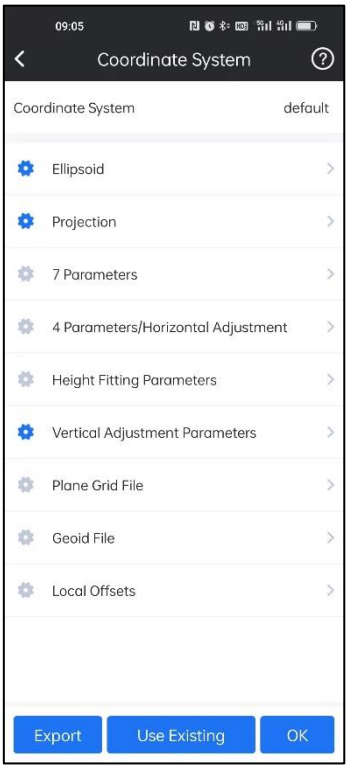
2.Click Use. Choose the calculate type. We can choose slope, level and level + slope.



3. Input the vertical adjustment parameters. Click OK.

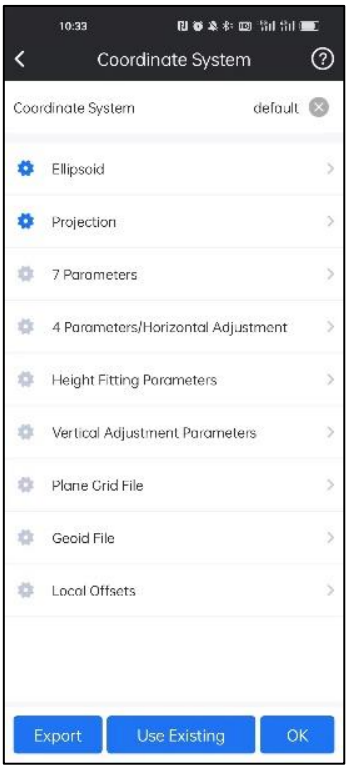


4.Then the vertical adjustment parameters are enabled. The icon in front of it will turn to .

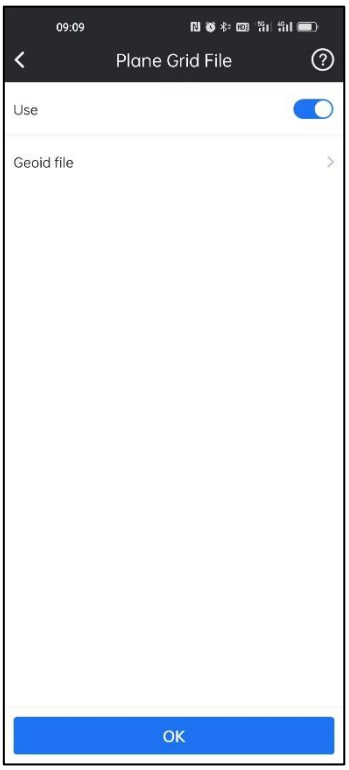


Plane Grid File:

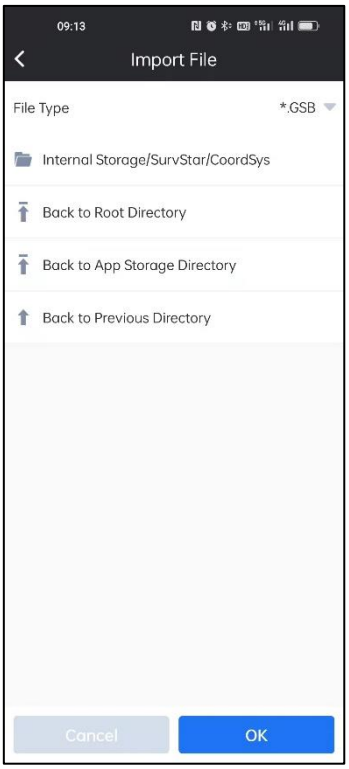
1.Click Plane Grid File.



2.Click Use. And click Geoid file.

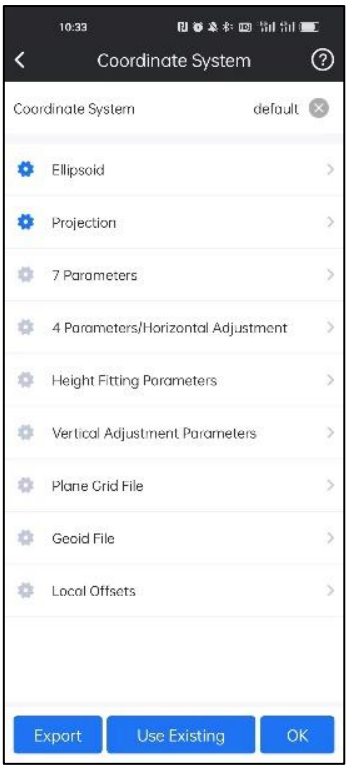


3.Find the folder of plane grid file (*.GSB). And choose the plane grid file we wanted to import. Click OK. Then the plane grid file will be applied.

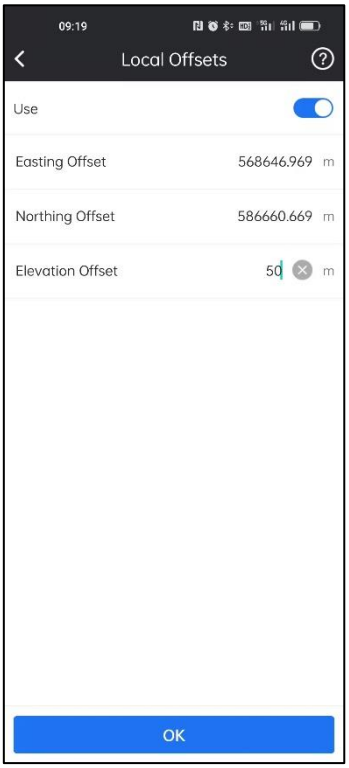


Local Offsets:

1.Click Local Offsets.

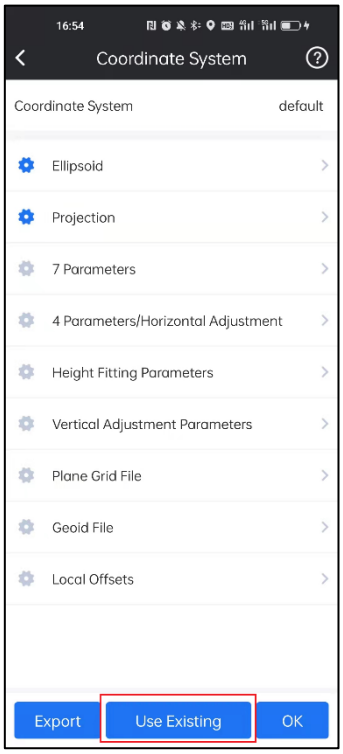


2.Click Use. And input the local offsets. Click OK. Then the local offsets will be applied.

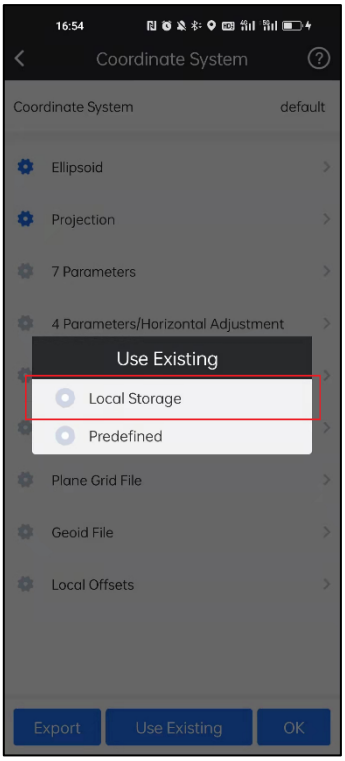


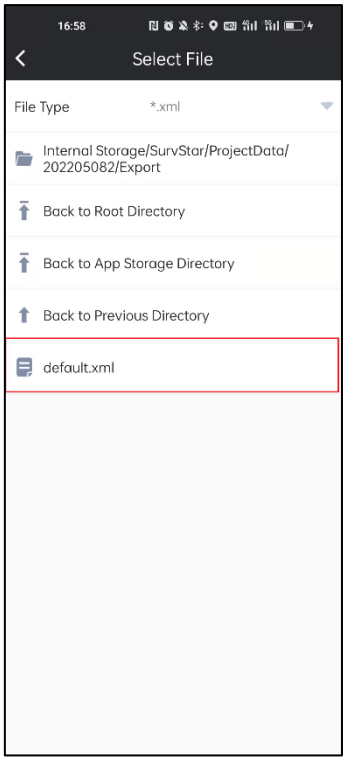
Use Existing File:

We can click Use Existing to select and apply the existing predefined coordinate system or use the coordinate system file (*.xml).

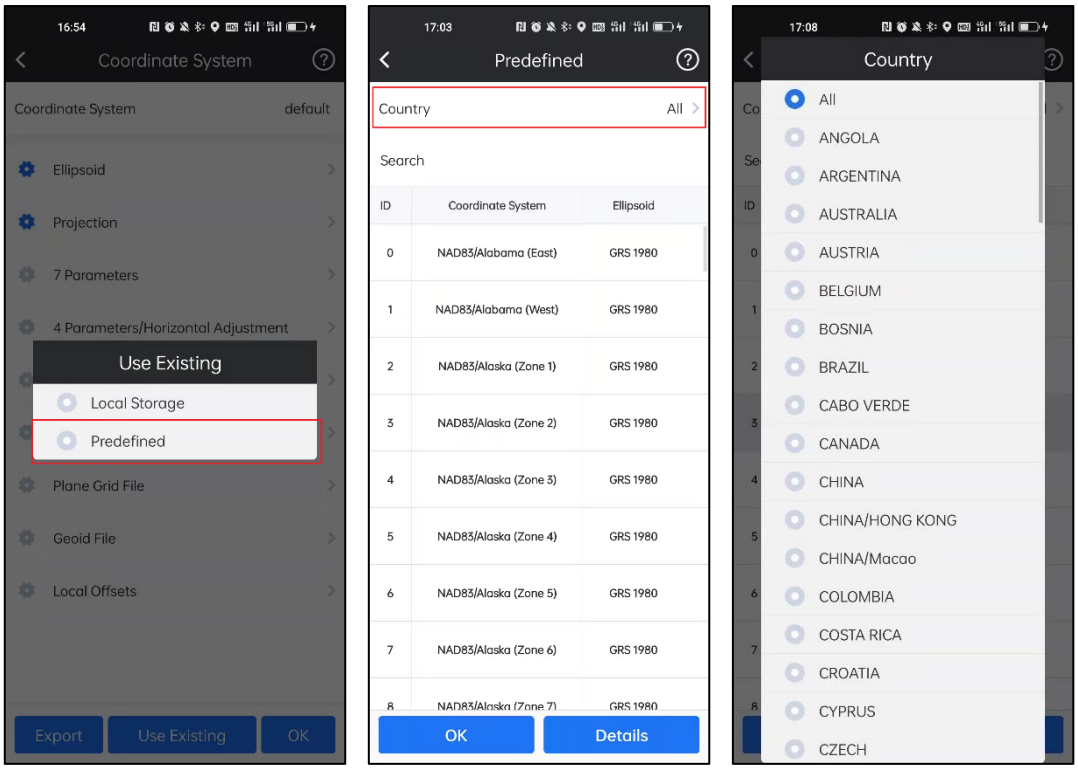


Click Local Storage, find the coordinate system file (*.xml) and click it, the coordinate system will be applied.

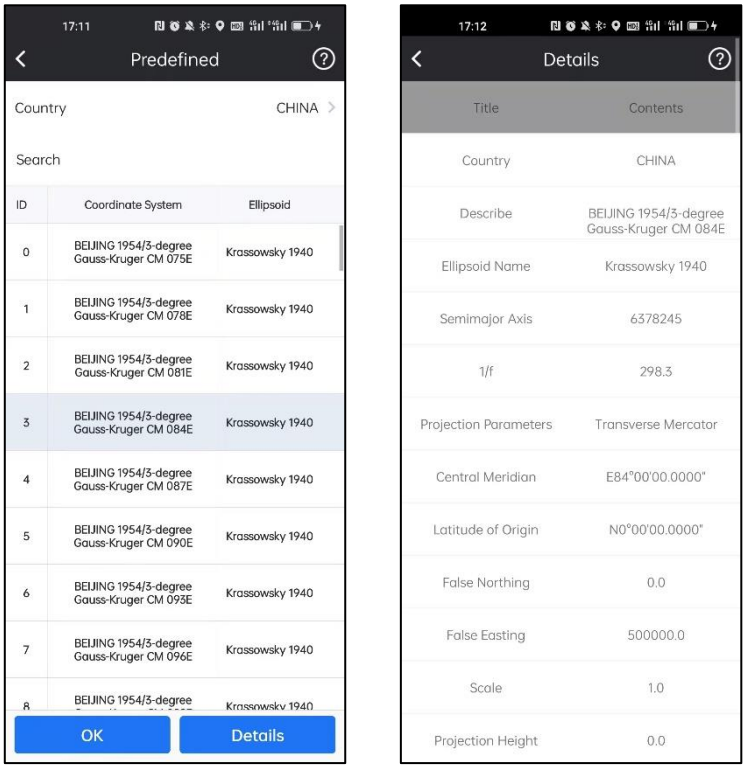




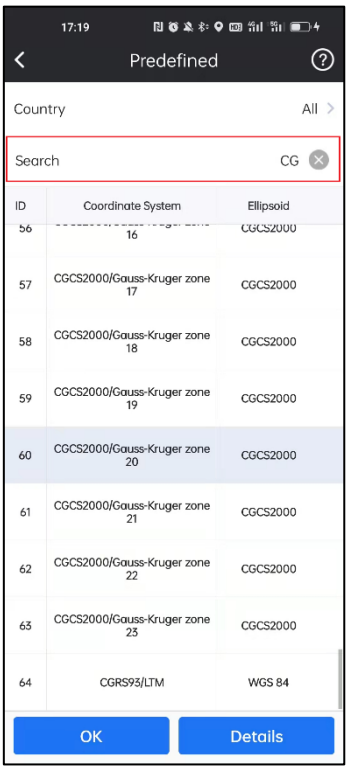
Click Predefined, then click Country and select the country or region (Alphabetical) where the needed coordinate system is located.



Then select the needed coordinate system and click OK to apply it, we can click Details to check its information.

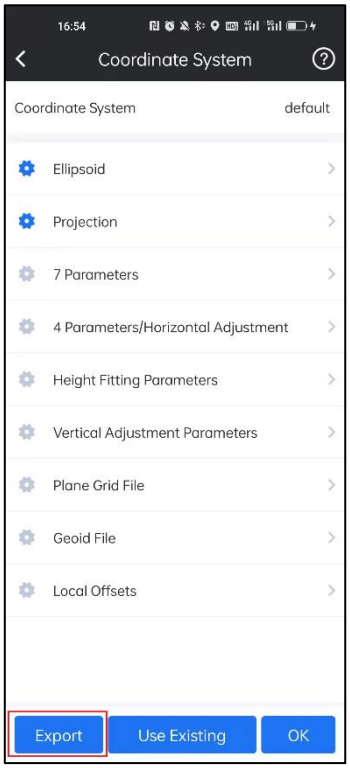


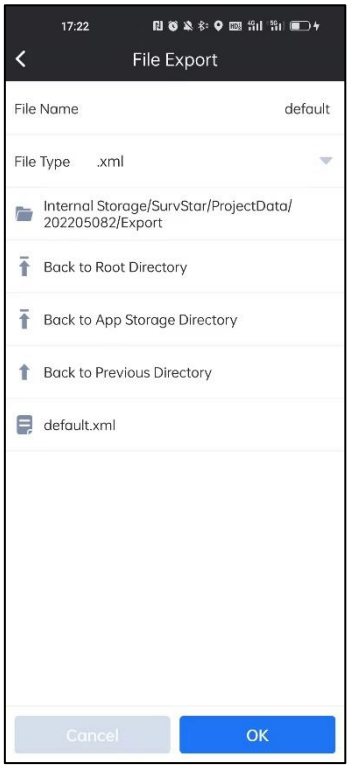
We can also search coordinate system with keywords in Search bar.



Export:

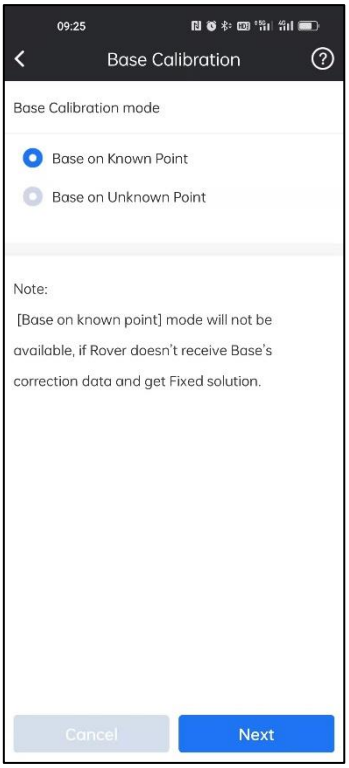
If we need to save the coordinate system in file, we can click Export, input File Name, select the path to save it and click OK, the coordinate system file will be exported.





3-4 Base Calibration

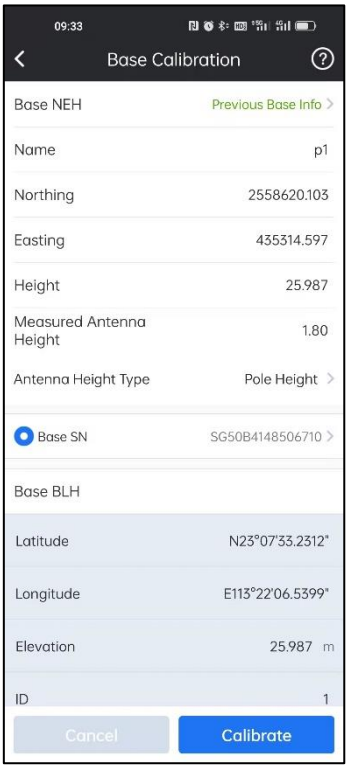
By clicking it, we can calibrate the base coordinate by using base and rover. There are two ways to calibrate: one is Base on Known Point Calibration, with base coordinate before and after station change to perform calibration; the other is Base on Unknown Point Calibration, with the coordinates of the points collected before and after the station change.



Base on Known Point:

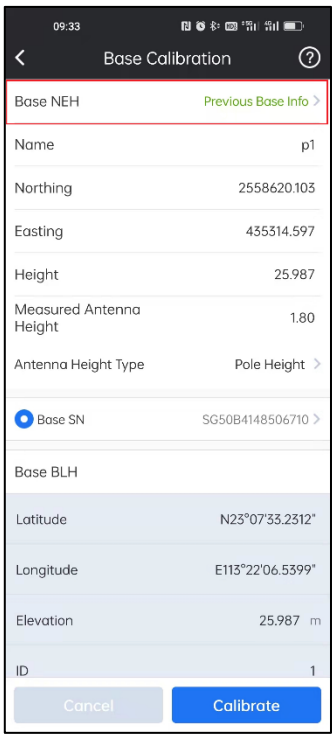
Base on Known Point Calibration only can used in fixed solution.

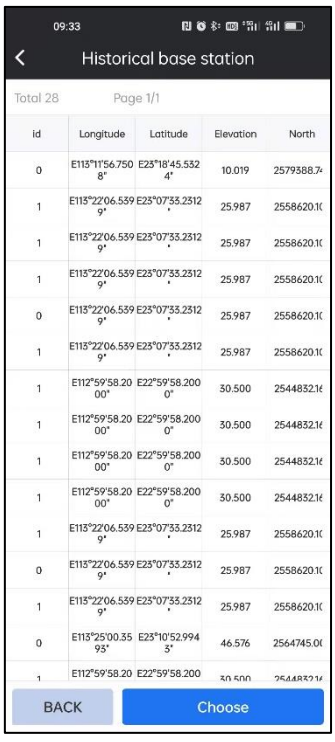
1.Choose Base on Known Point, and click Next. Then enter into this page.



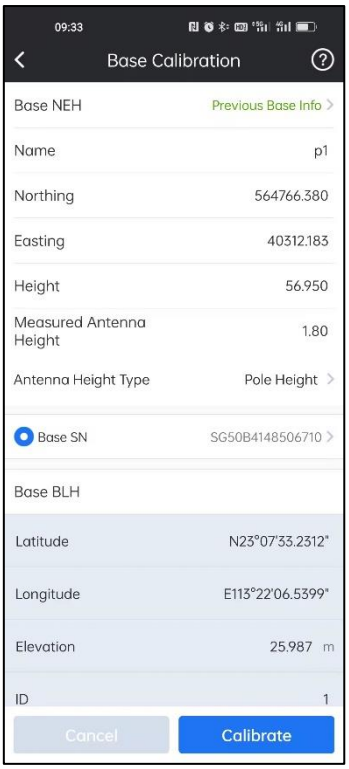
2.In that page, we can click Base NEH to find the historical base station information.

And it will enter to Historical base station page.

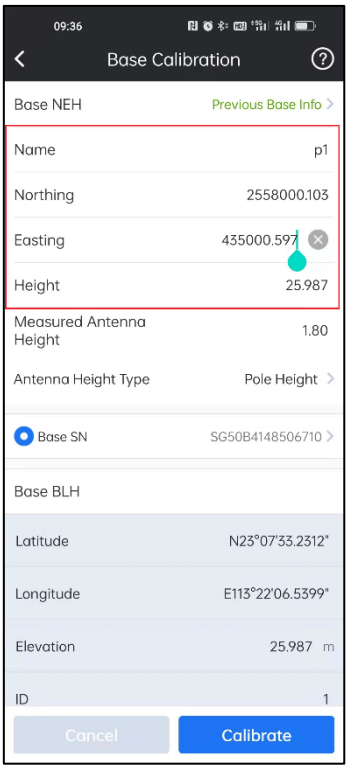




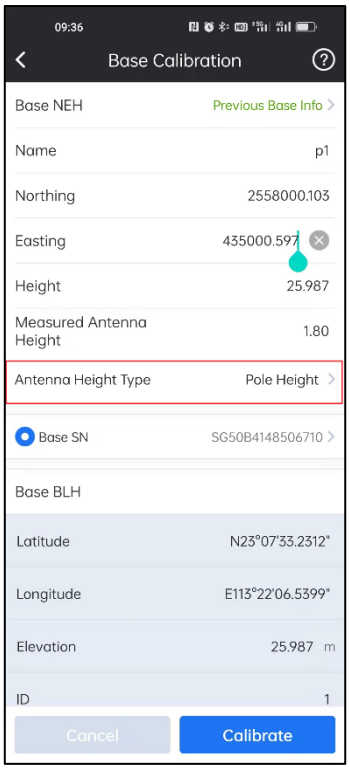
3.We can choose the needed historical base station, and click Choose, then the coordinate will apply to the Base Calibration page.

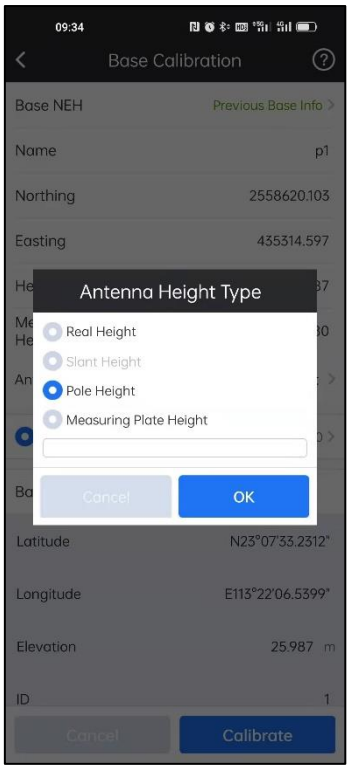


4.We can also input the needed base information with name and coordinate.

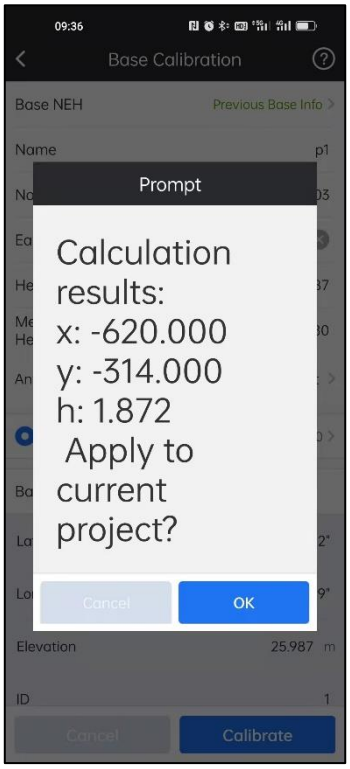


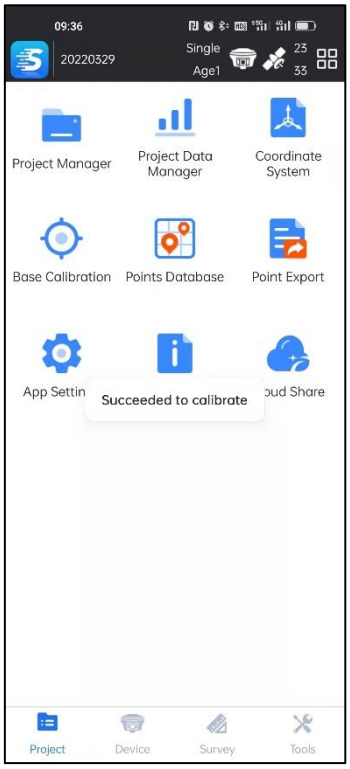
5.Then input the measured antenna height and click antenna height type to choose the right antenna height type.



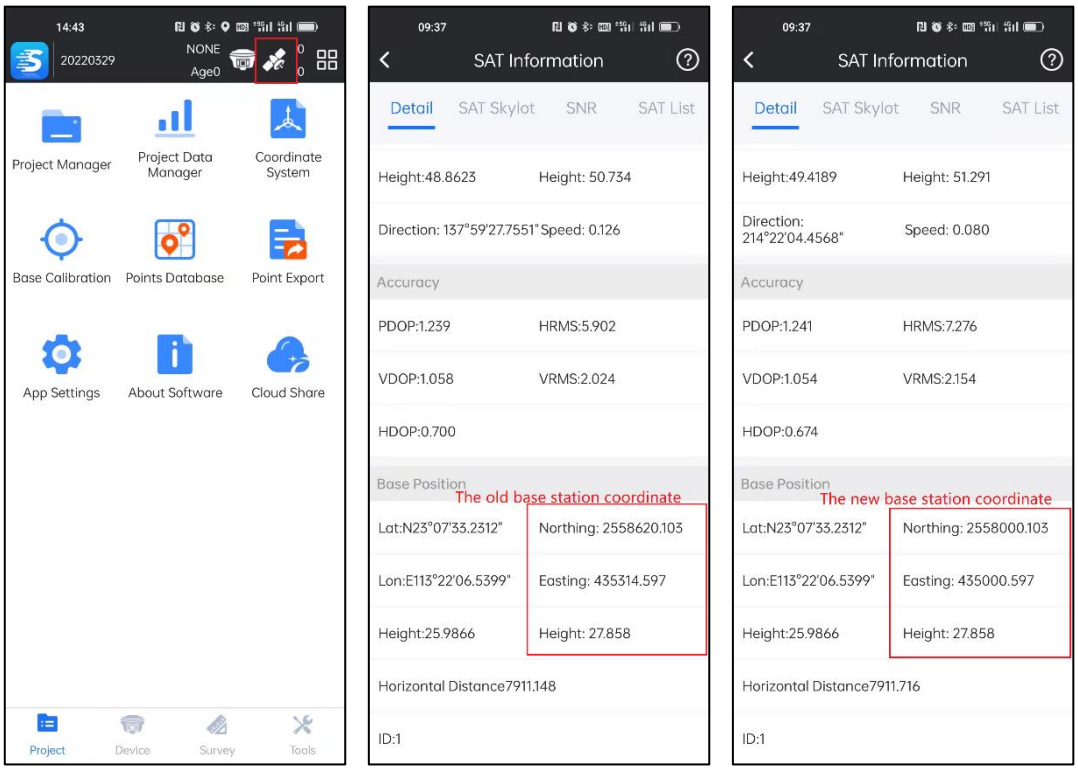


6.Click Calibrate and then there will be a popup to show the calculation results. Click OK then the results will be applied.

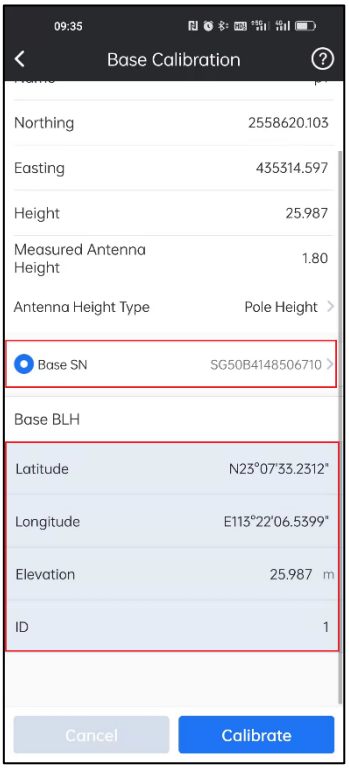




7.We can open the base station information to check the change.

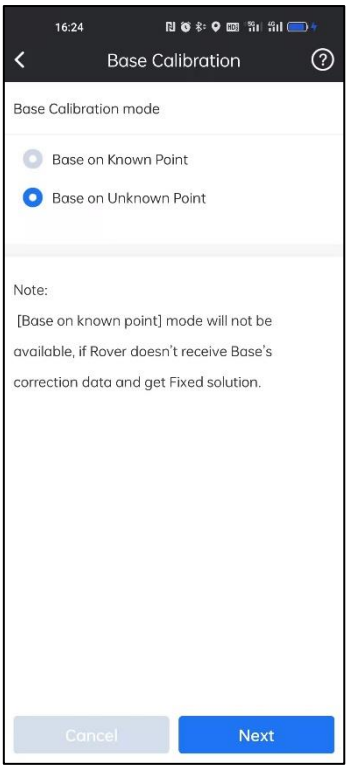


These are the information of base station and the base device SN.

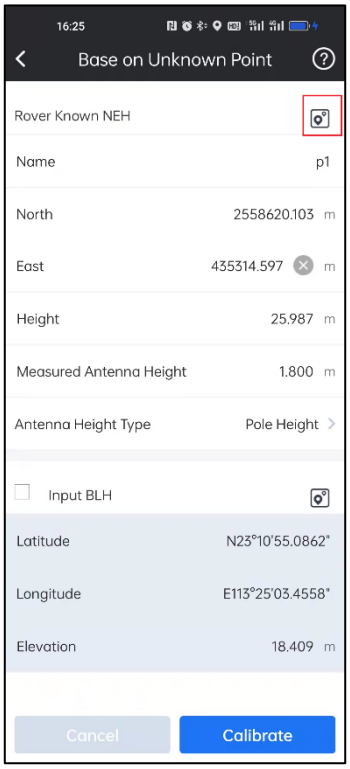


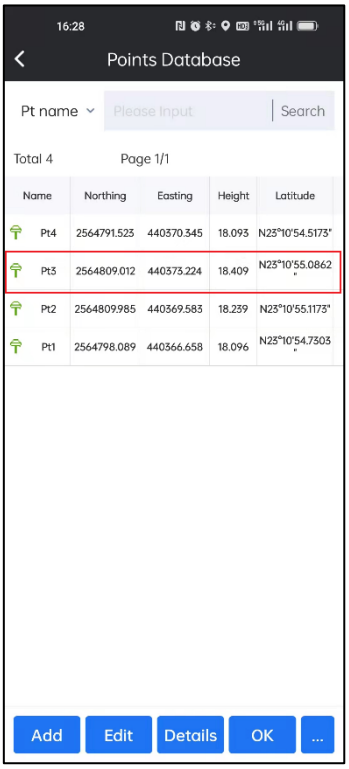
Base on Unknown Point:

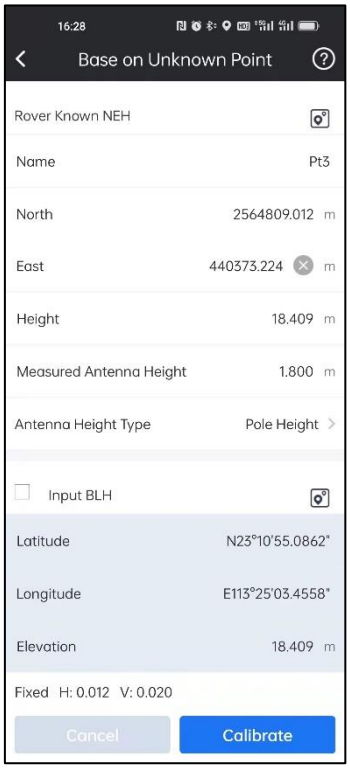
Choose Base on Unknown Point. And Click Next.



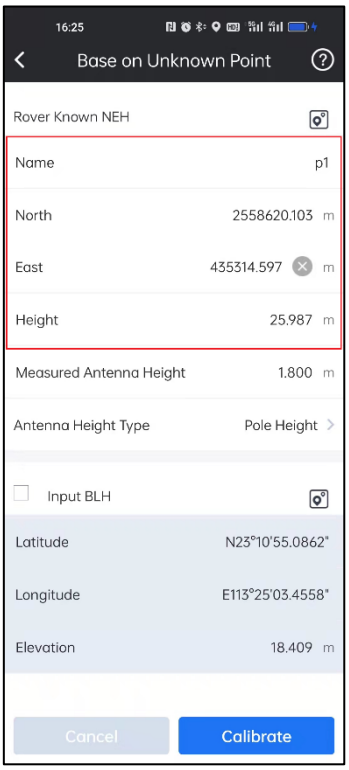
Firstly, we need to input the targeted North, East and Height. If we have the surveyed it in point database, we can click the icon in Rover Known NEH bar, and choose the right point, click OK. Then the NEH coordinate will input in it.







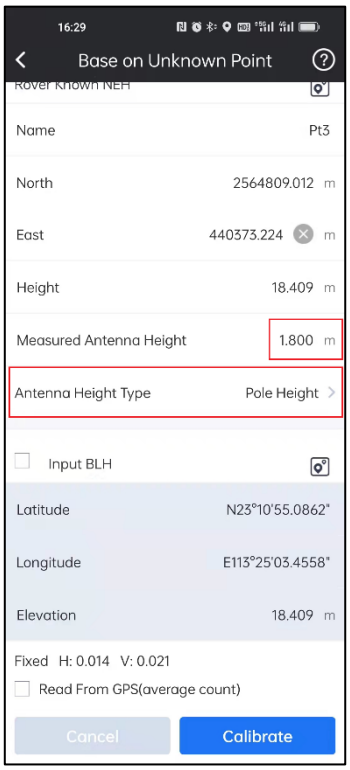
Or we can input NEH information directly.

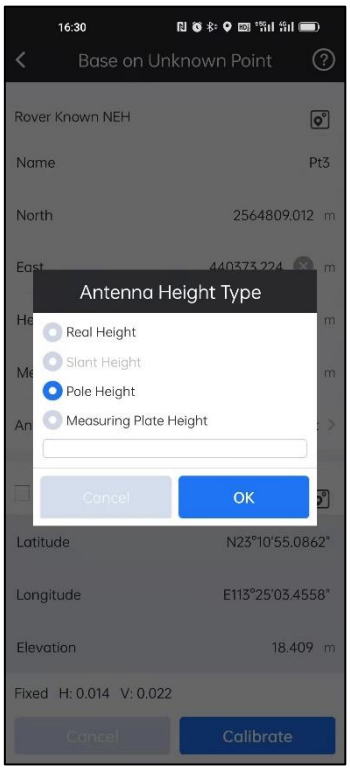


Then we need to get the needed to calibrate coordinate: latitude, longitude and elevation. There are two ways we can choose: Collect coordinates on site or use the existing longitude, latitude and Elevation.

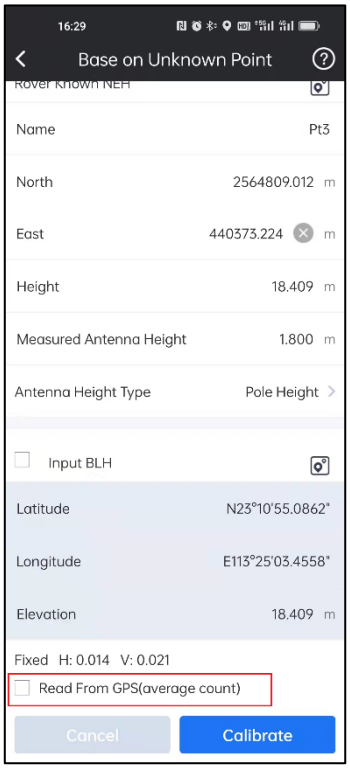
Collect coordinates on site:

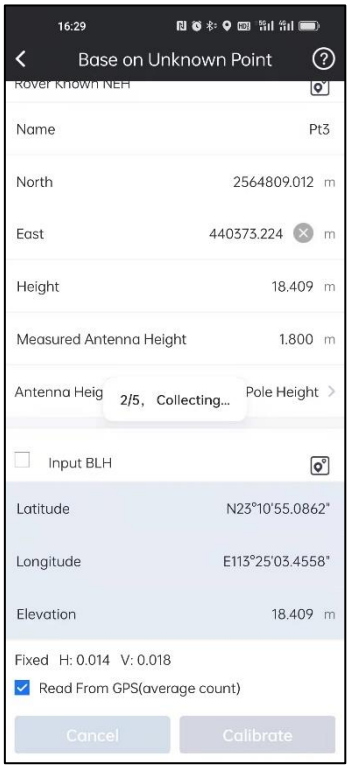
Input the measured antenna height and click antenna height type, choose the right antenna height measured type.



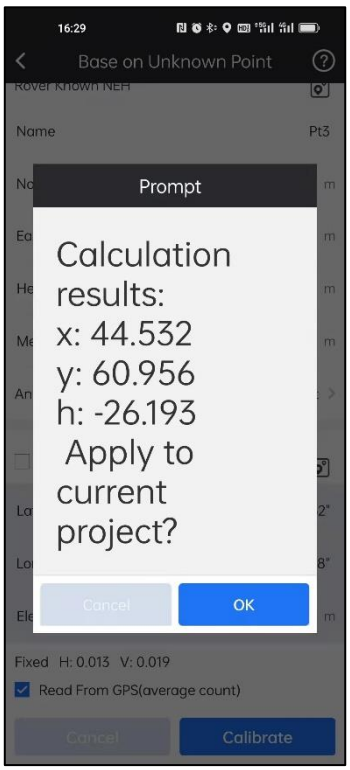


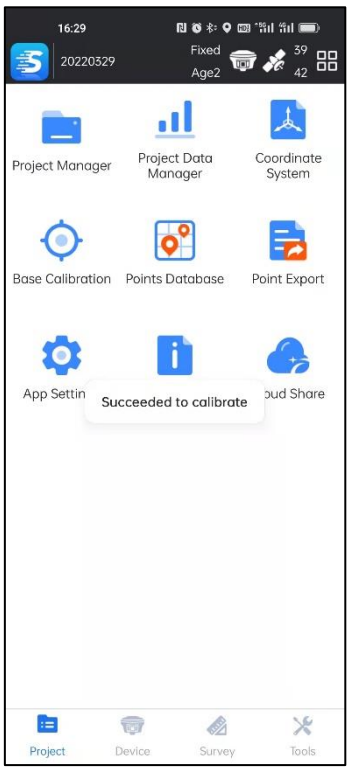
Then click Calibration to calculate the calibration parameters. If we don't click the Read From GPS(average count). The coordinate survey will only do for one time. If we click it, then it will collect for 5 times.





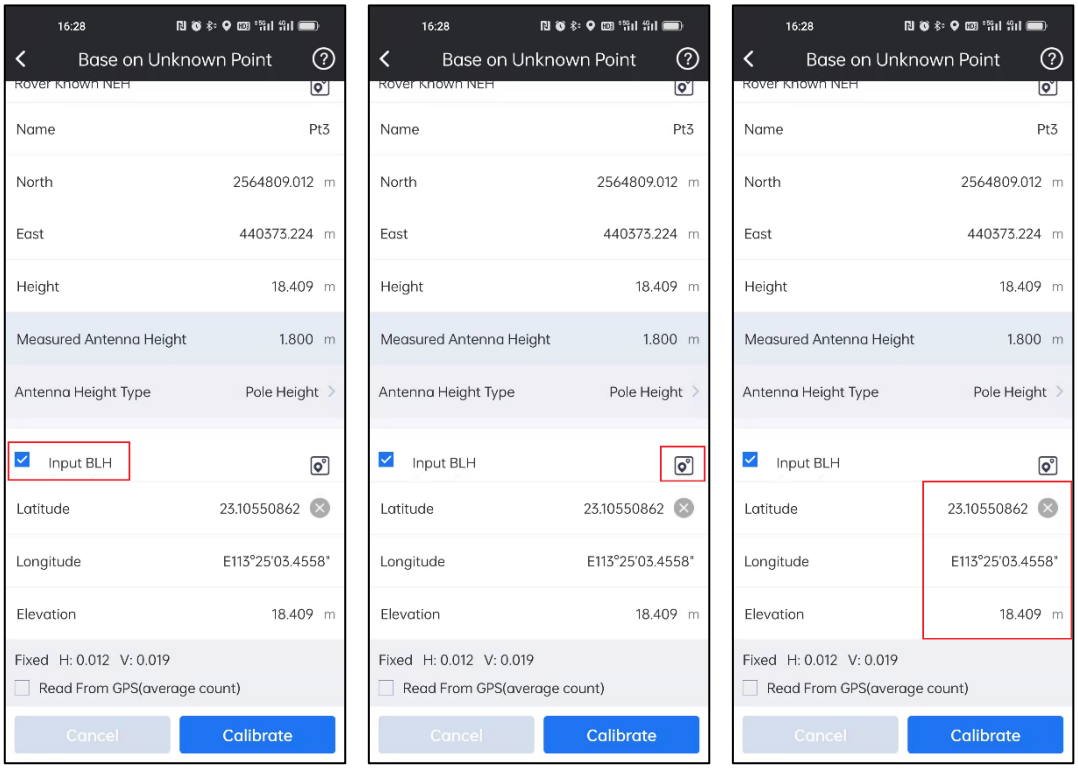
It will show the calculation results, and click OK. Then the calibration is finished.



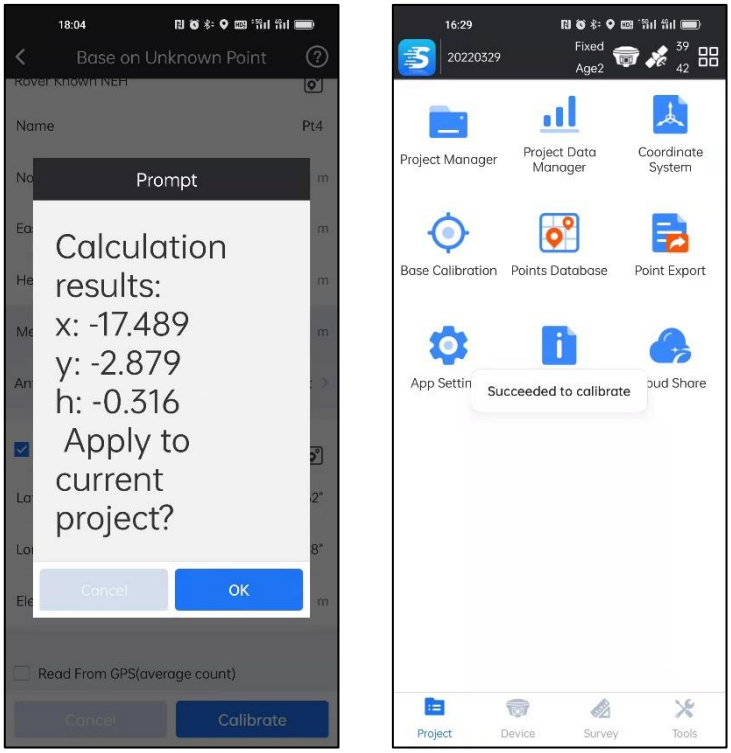


Use the existing longitude, latitude and Elevation:

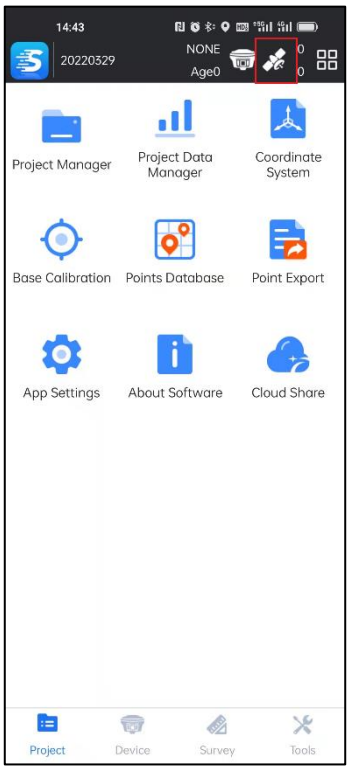
Click Input BLH. If we have the surveyed point in point database, we can click the icon in right of Input BLH. And choose that point. Or we can input BLH information directly.

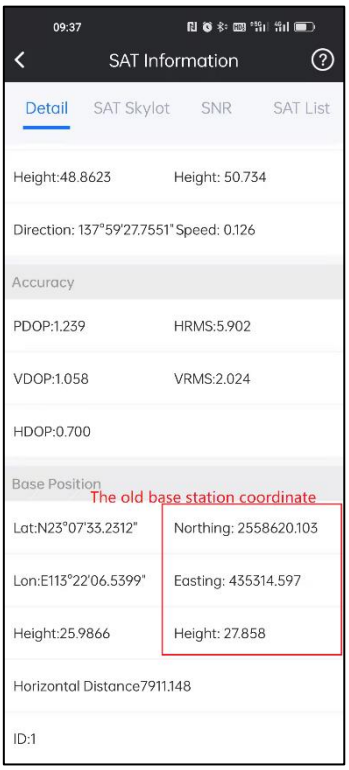


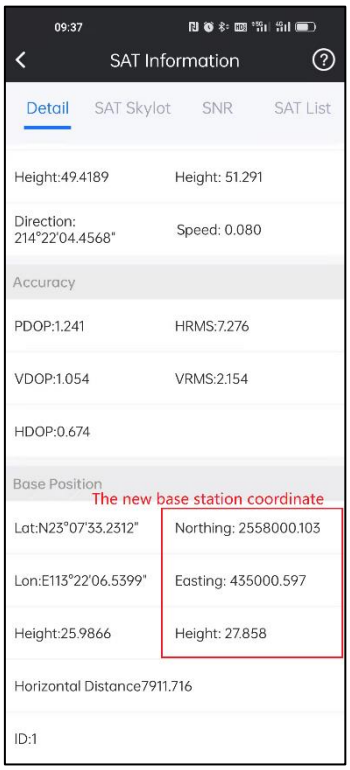
Then click Calibrate. It will show the calculation results, and click OK. Then the calibration is finished.



We can open the base station information to check the change.





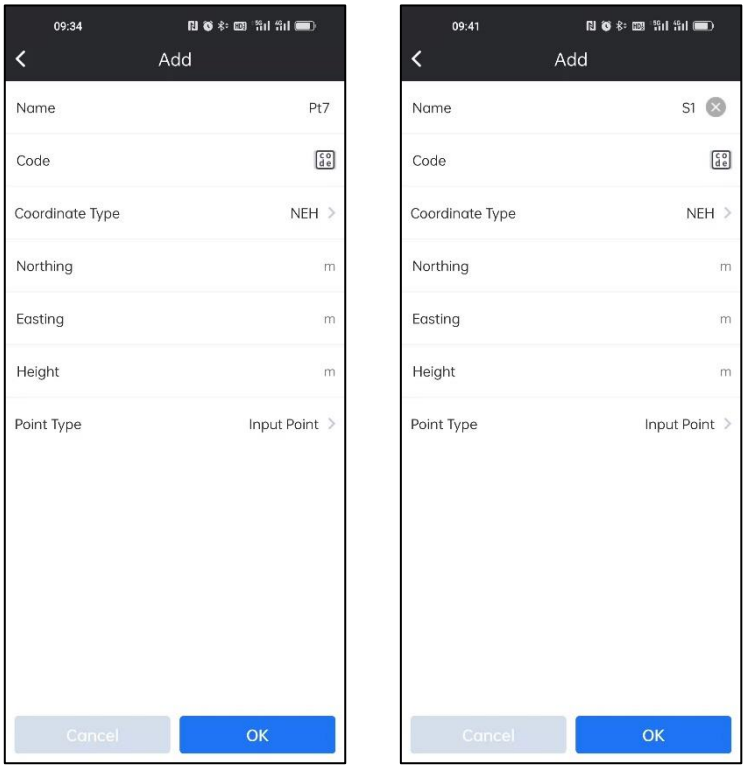


3-5 Points Database

By clicking it, we can uniformly manage all types of coordinate points. We can input coordinate points used in survey, which offers convenient to invoke in Point Stakeout. We can also enter point name or code in the lookup to quickly search for coordinate points. It contains Add, Edit, Details, Import, Delete, Options operation.

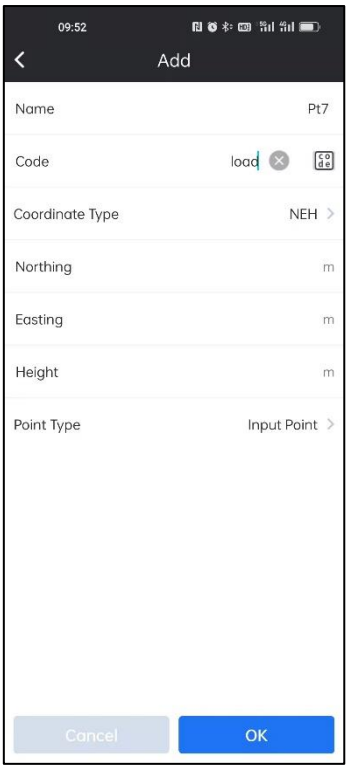
Add:

Press Add. We can enter to the Add page. The new point will be named continuously according to the current point library point name. And we can change it.

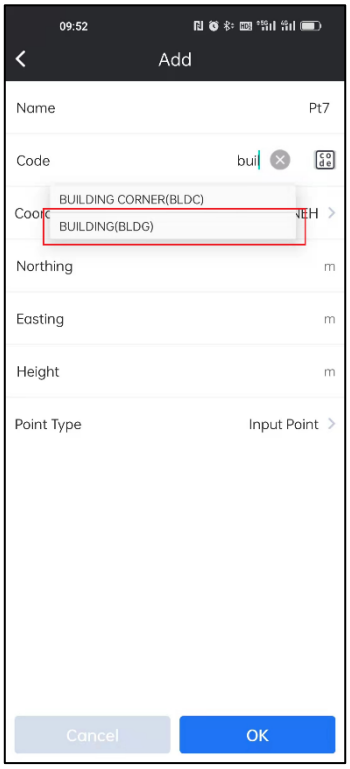


The code is not necessary. We can leave it blank.

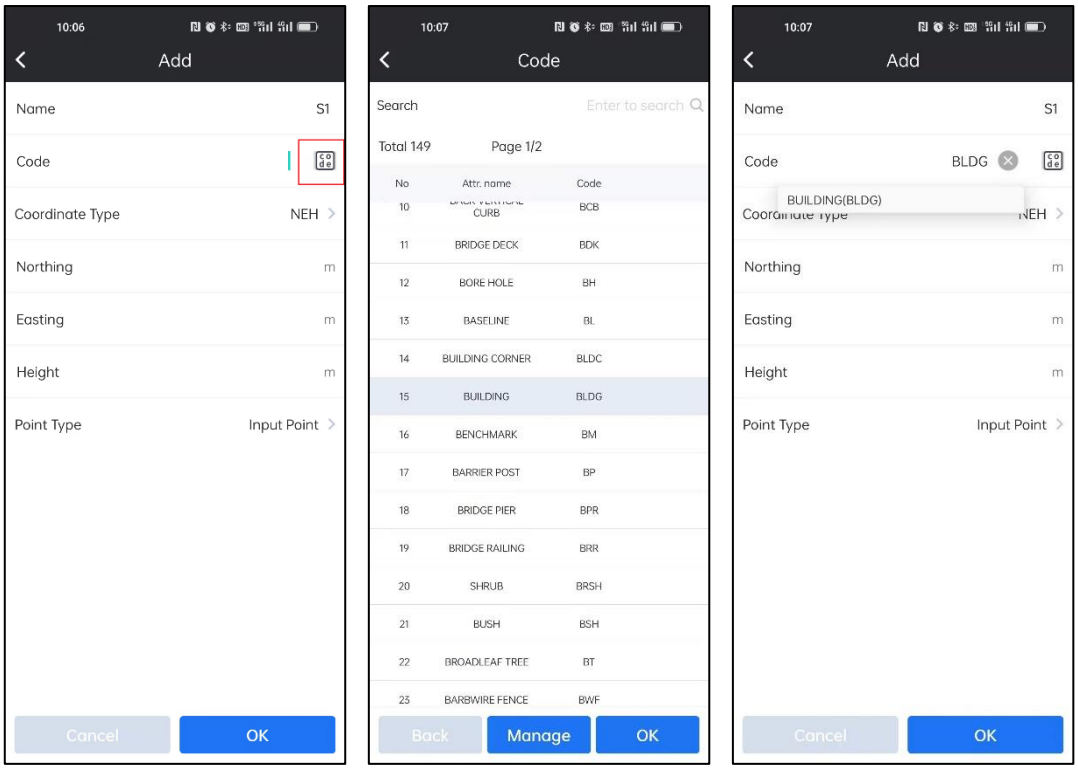
If we need to use the code, then we can input it directly.



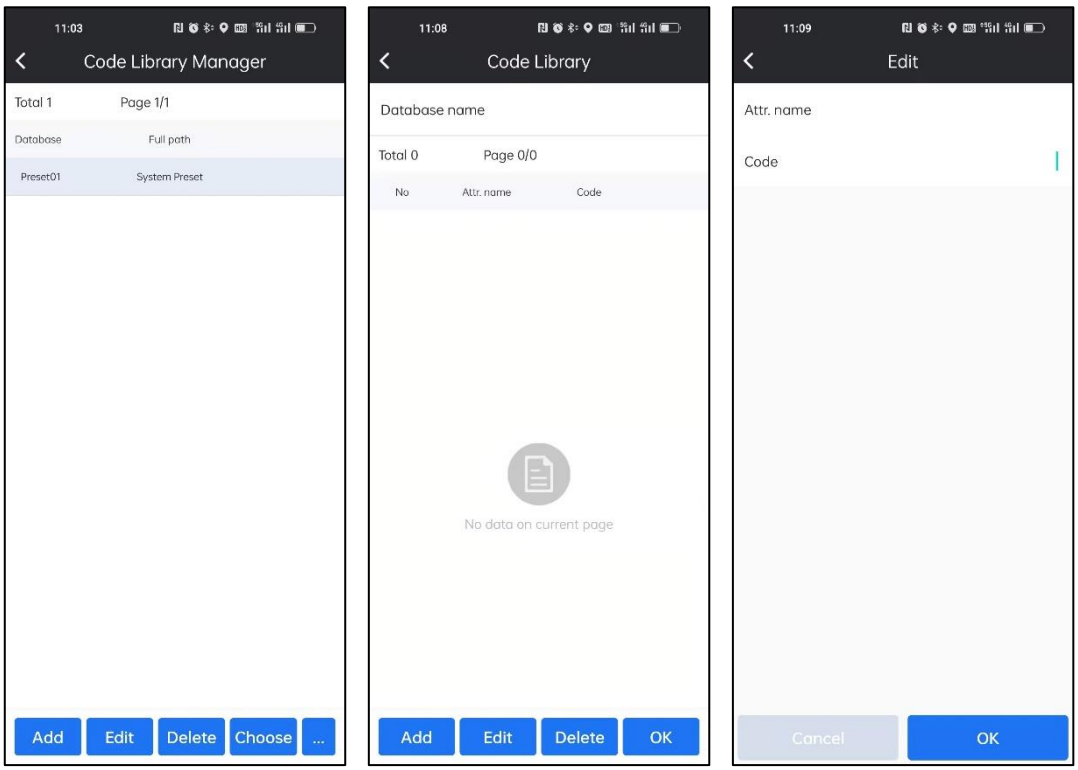
Or we can input key words to search the code wanted in the code database. And click the code we need.



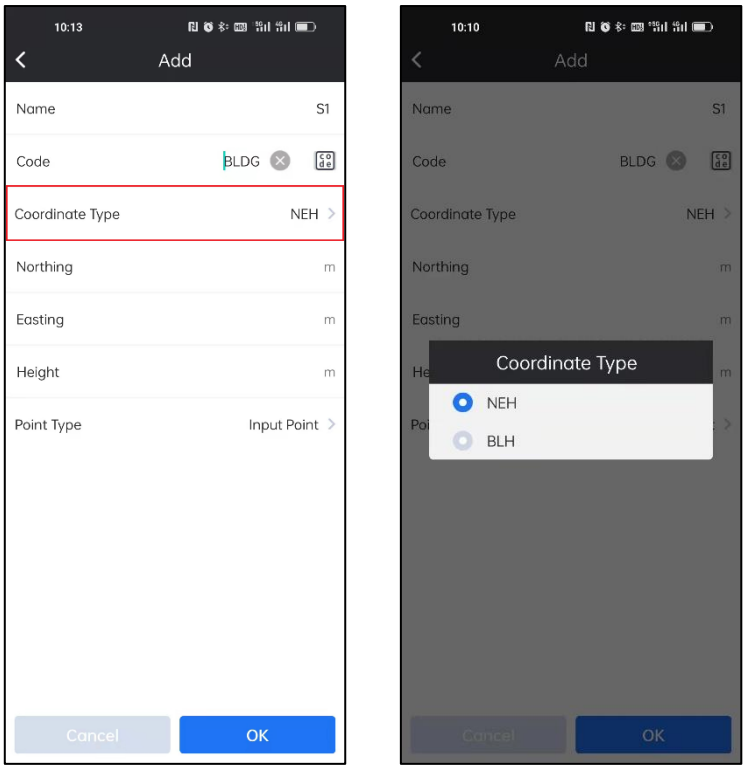
We can also click the icon in right of the Code bar, and enter to the code database. There is a default code database in SurvStar. Choose the code we need and click OK.



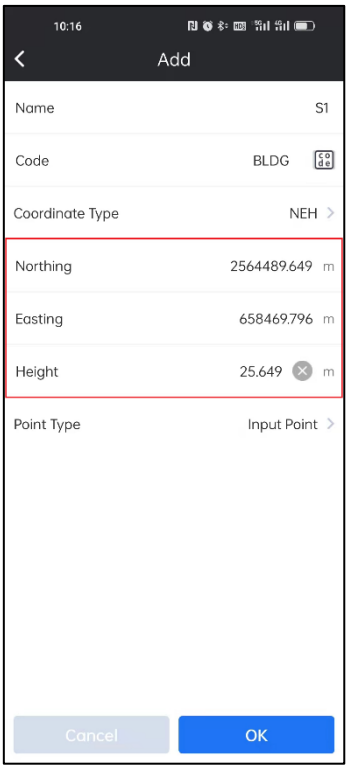
Click Manage. We can manage the code database. It includes Add, Edit, Delete, Choose and Import. Click Add to add a code library. We can create the code we need.



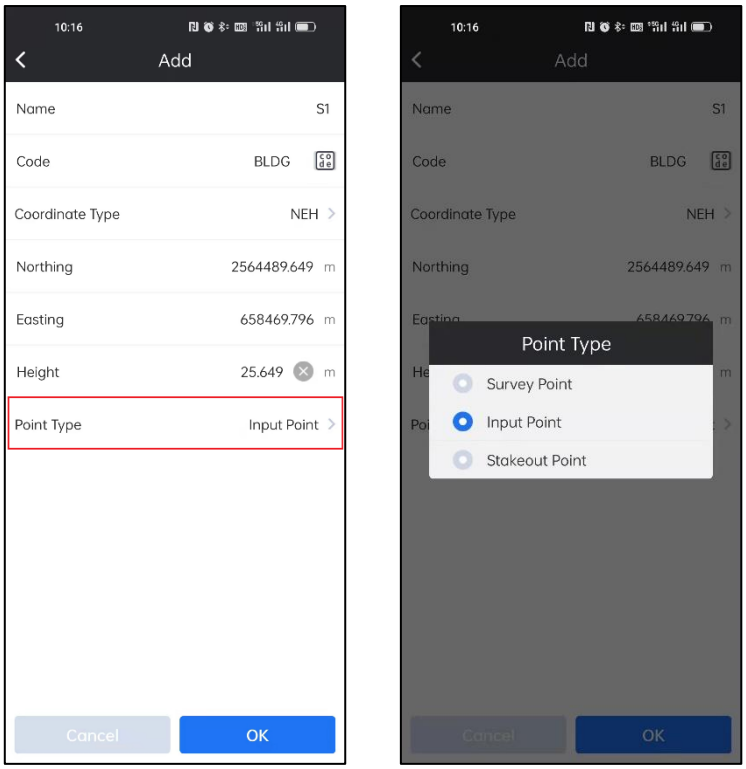
Then we need to choose the coordinate type. There are two types: NEH and BLH. It will be NEH by default. We can change it by clicking the Coordinate Type bar.



Then we can input the coordinate of the point.



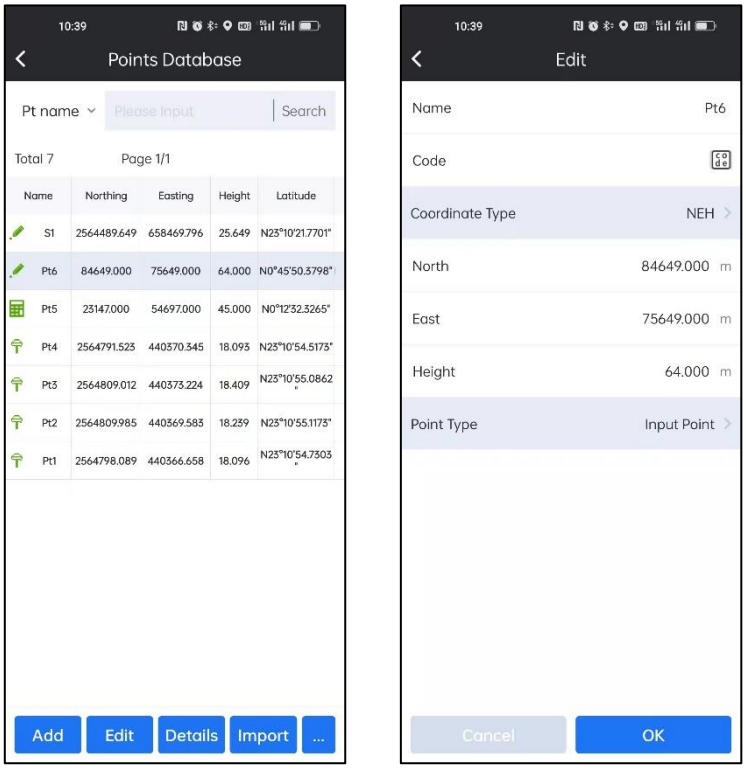
Then choose the point Type. There are three types: Input Point, Survey Point and Stakeout Point. It is Input Point by default.



Click OK. The new point is created in point database.

Edit:

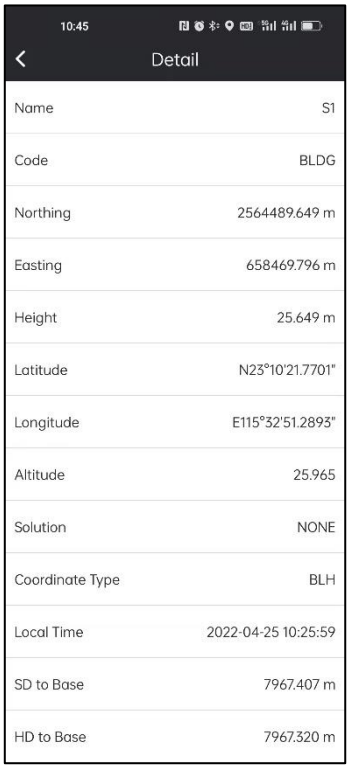
Select the point we want to edit and click Edit. We can edit the coordinate, code and name of the selected point.

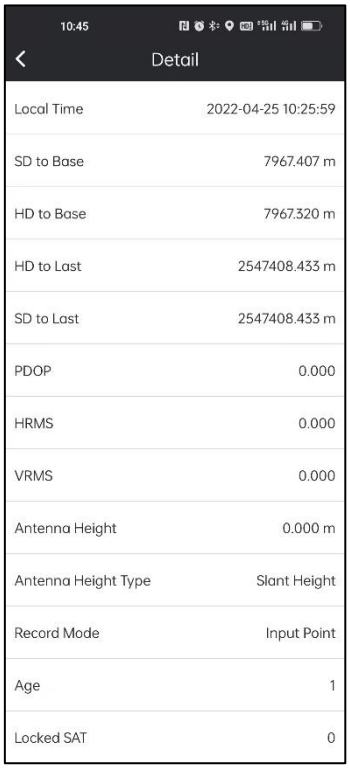


Input point's coordinate can be edited but the Survey point and the Stakeout Point can only edit Name and Code.

Details:

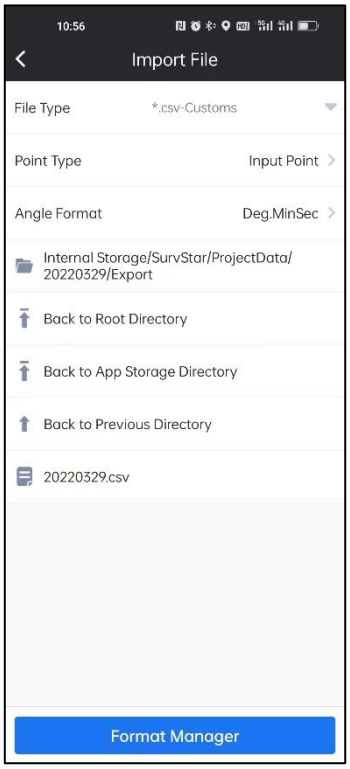
Select the point we want to check and click Details. We can check the details of the selected point.

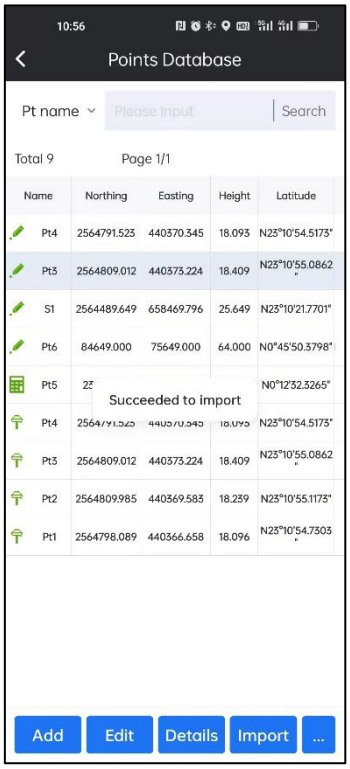




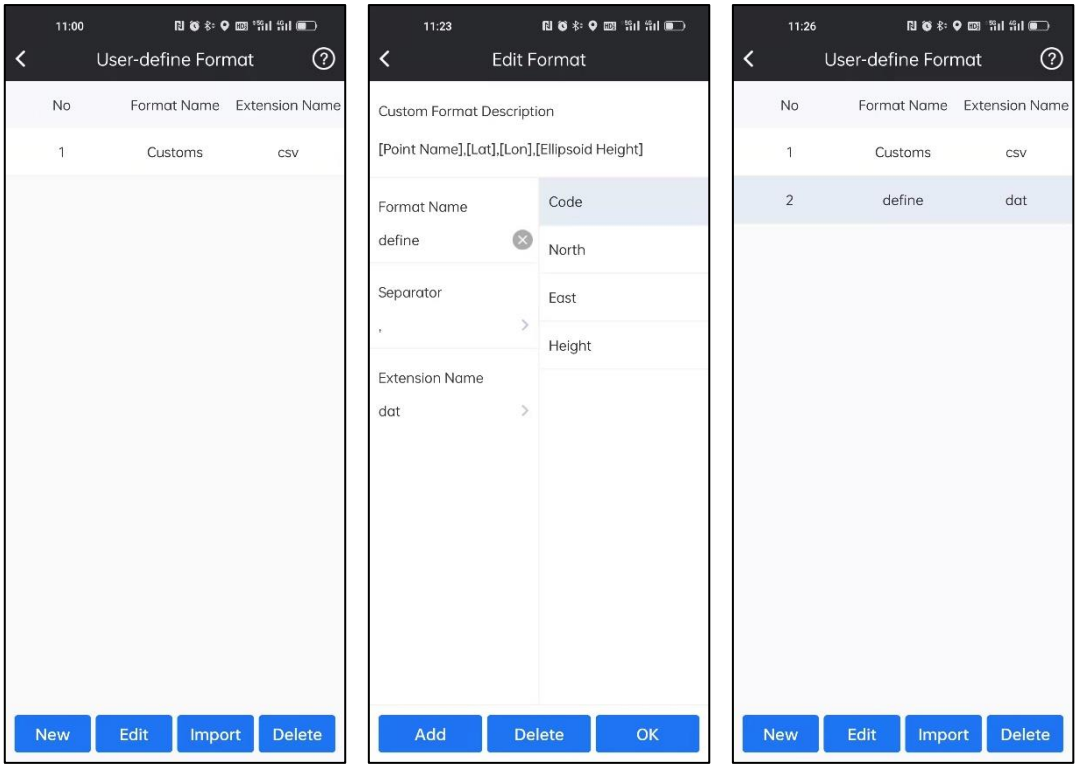
Import:

Click Import. Select the File Format, Point Type. Select file path and find the file and click the file. Then the file will import to point database.

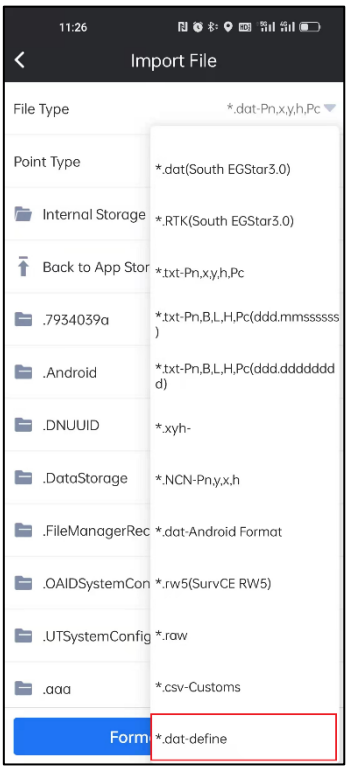




Click Format Manager. We can enter to User-define Format page. In that page we can manage the file format in SurvStar. Click New we can create a defined format. Input Format name, select Separator(, @ Space) and Extension Name (dat, csv, txt), select Custom format description (to select [Point Name] and press Add means format includes point name), press OK to create data format.

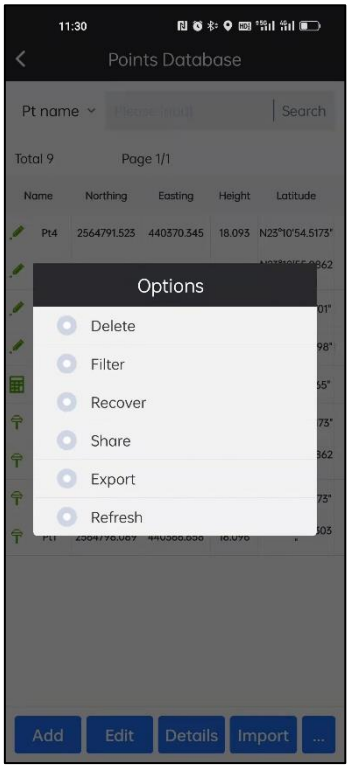


Then we can import the file with the defined format.



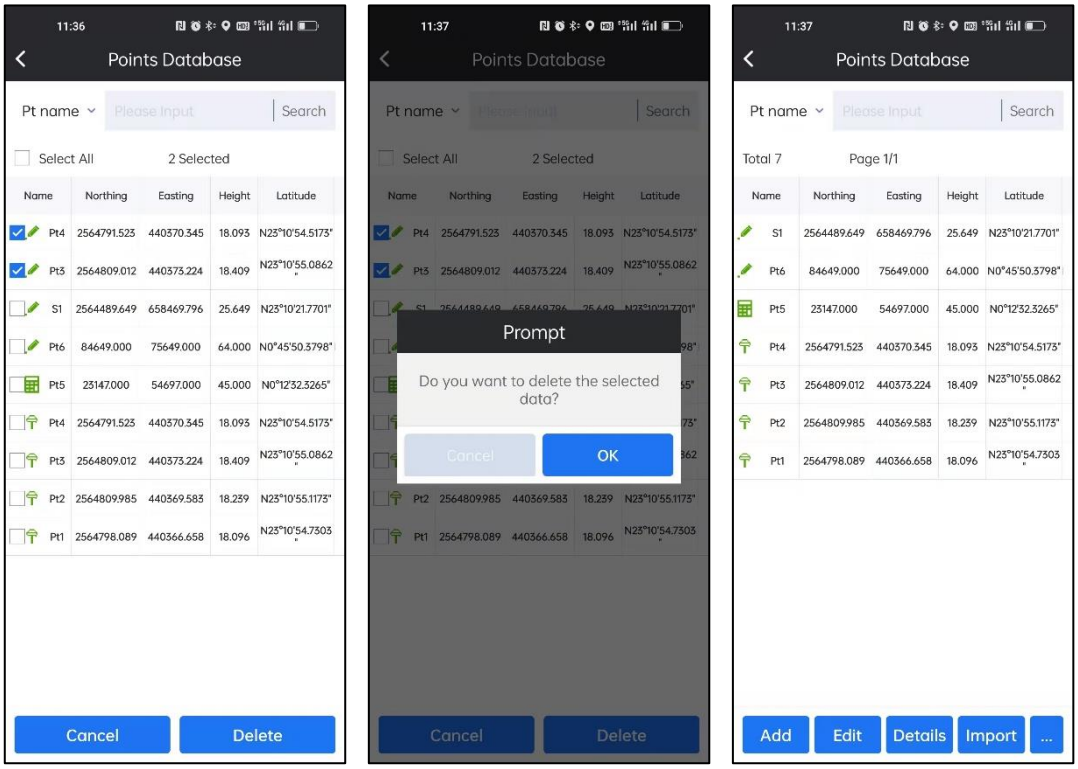
Options:

Click [...] in the right of the tool bar. Then we can use the other function as Delete, Filter, Recover, Share, Export and Refresh.



Delete:

Click Delete. And select the points, Then Click Delete. The selected points will be deleted.

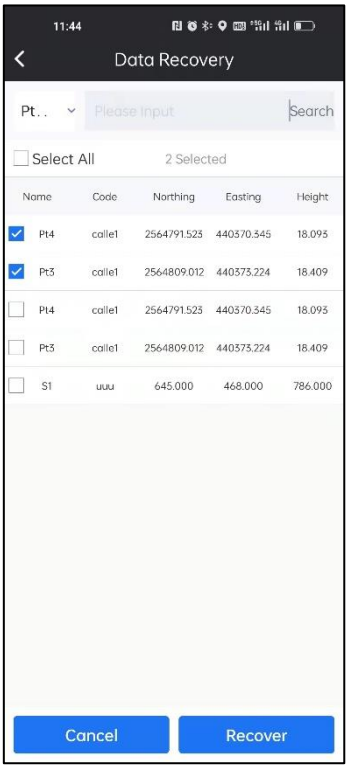


Filter:

Click Filter. Enabling the point types need to display can filter those types disabled. It includes point types: Survey Point , Input Point , Stake Point .

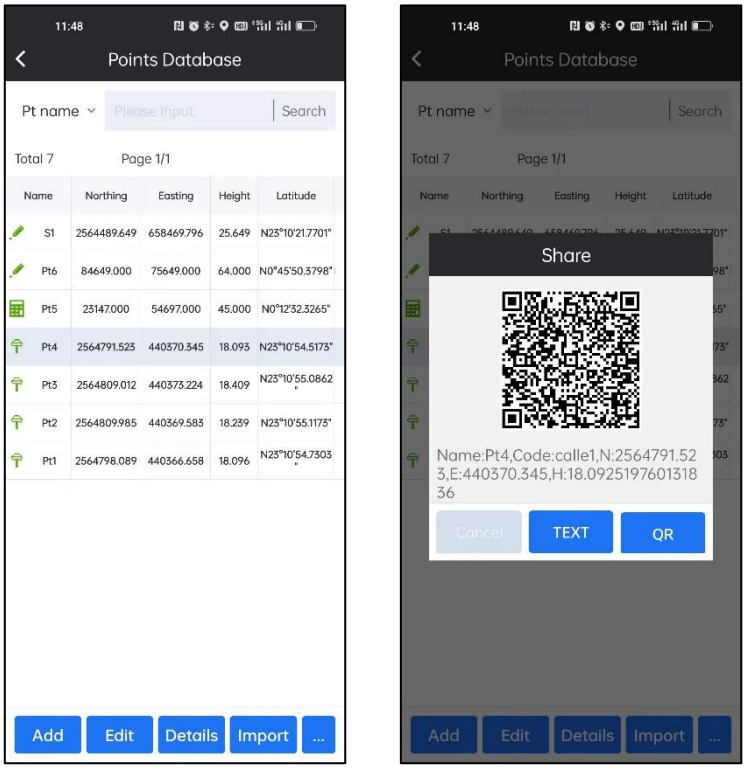
Recover:

Click Recover. We can recover the points we deleted before. Select the points and click Recover.



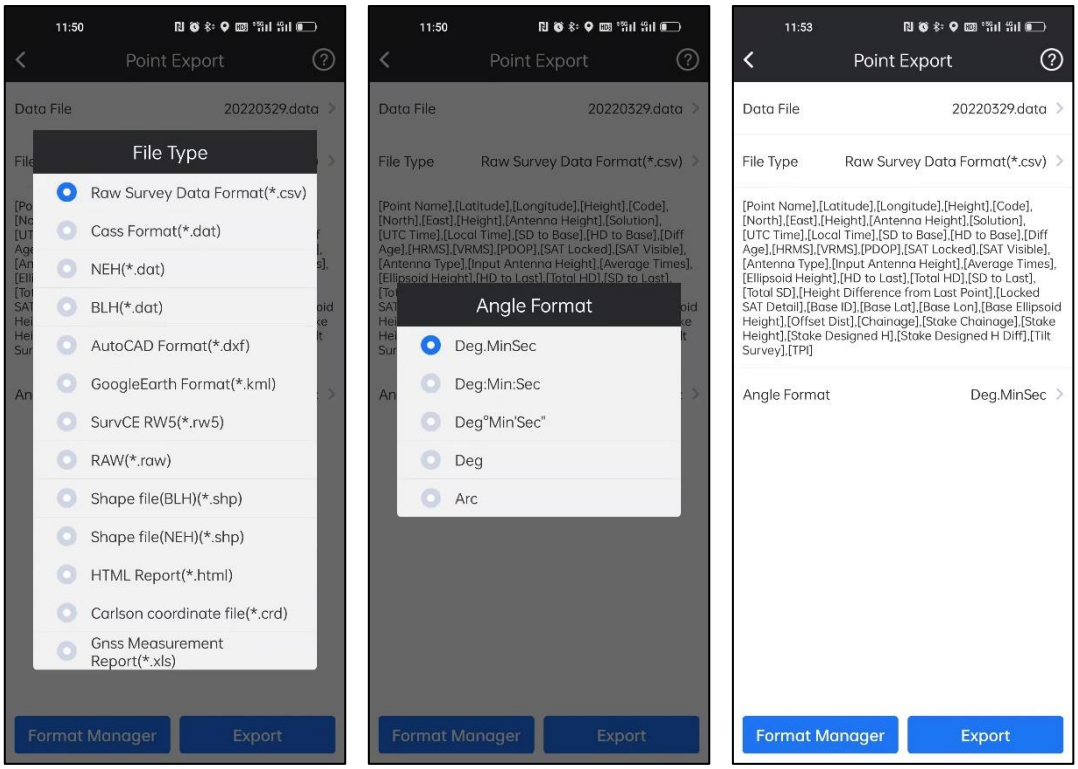
Share:

Select the point in point database, and click Share. It will share the point information with QR or TEXT.

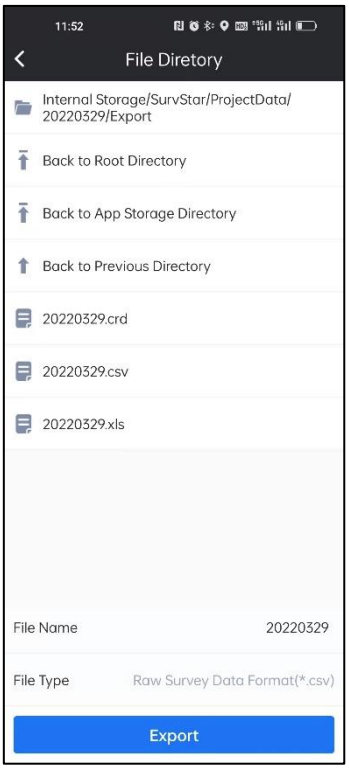


Export:

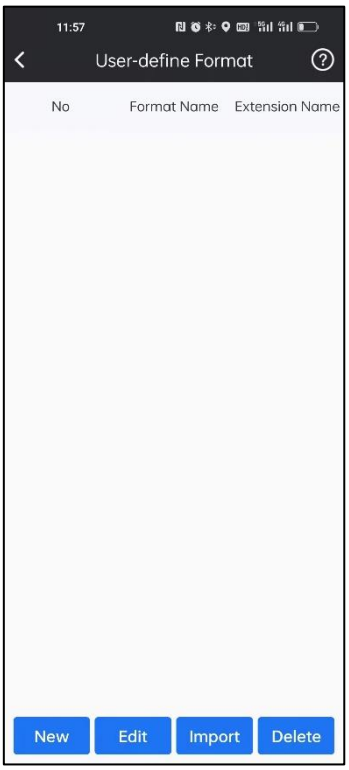
Click Export. Select the data file, file type and angle format. Then click Export.

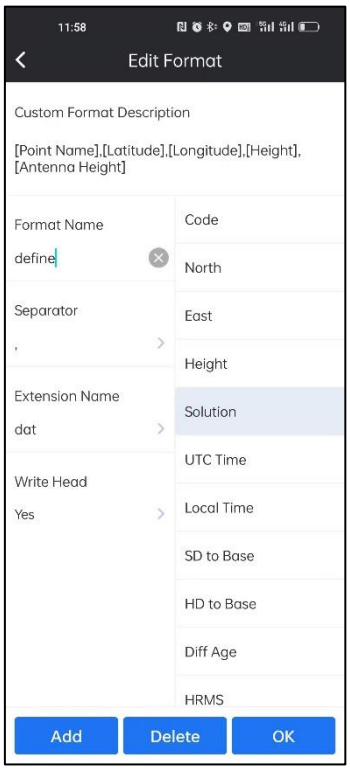


Select the export file path and click Export.



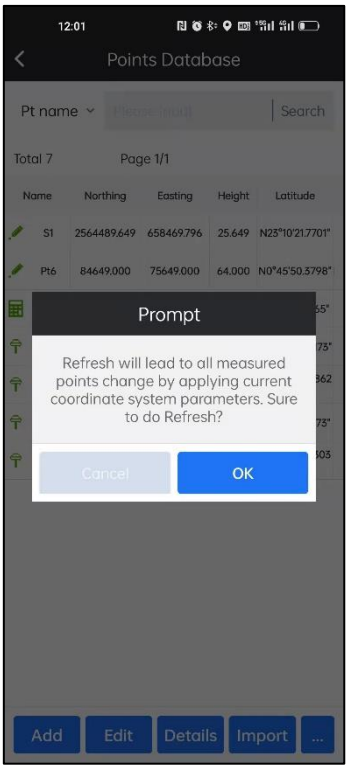
We can click Format Manager to create the export file format.





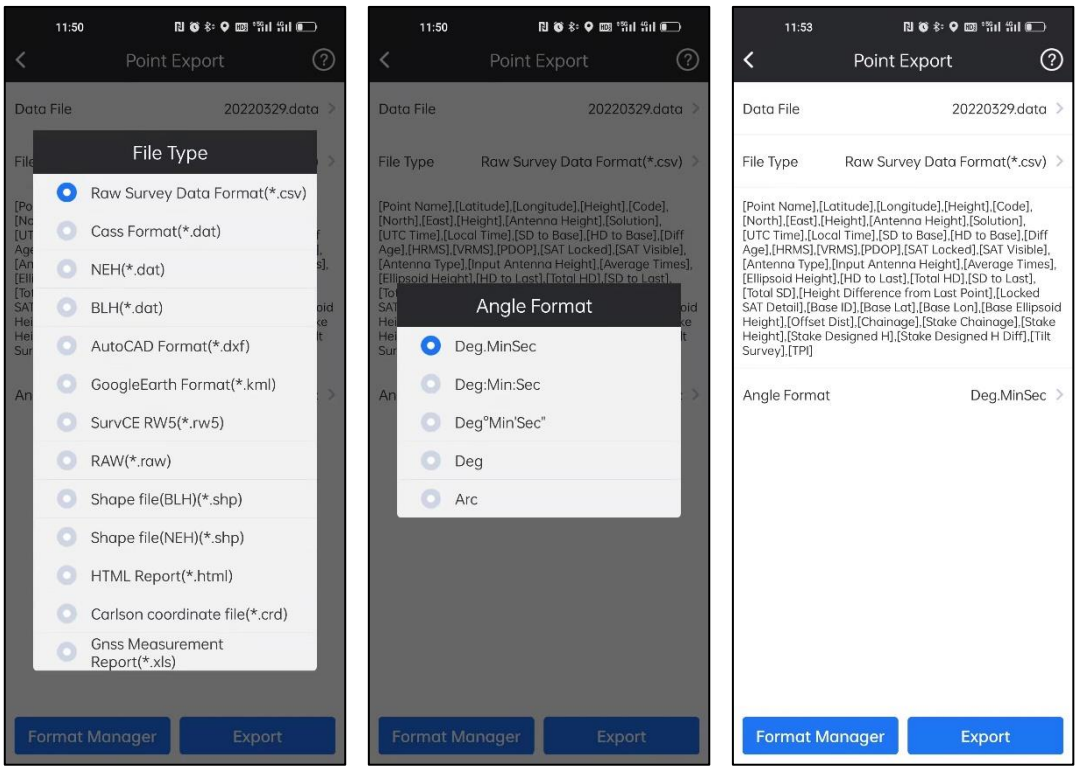
Refresh:

Click Refresh, we can apply the new coordinate parameters to the points in database.

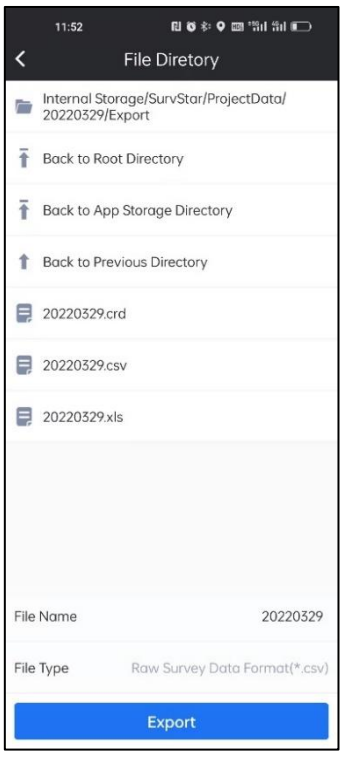


3-6 Point Export

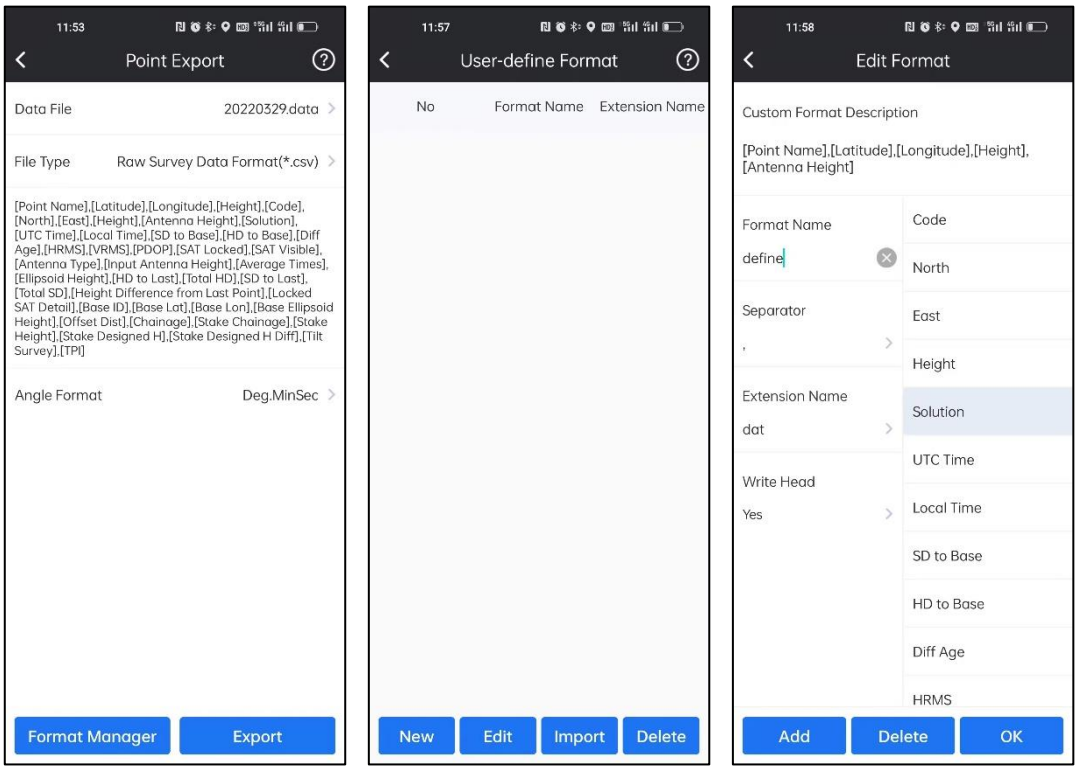
By clicking this, we can export points file. Select the data file, file type and angle format. Then click Export.



Select the export file path and click Export.

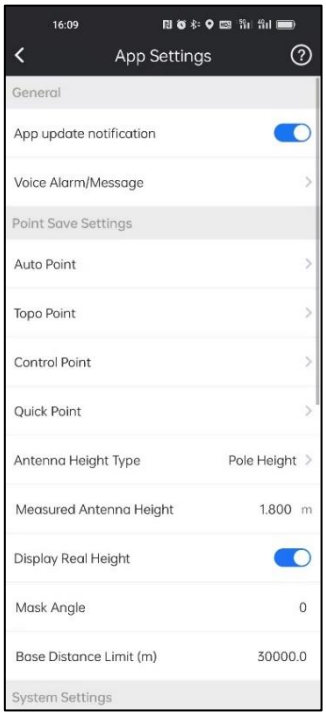


We can click Format Manager to create the export file format.

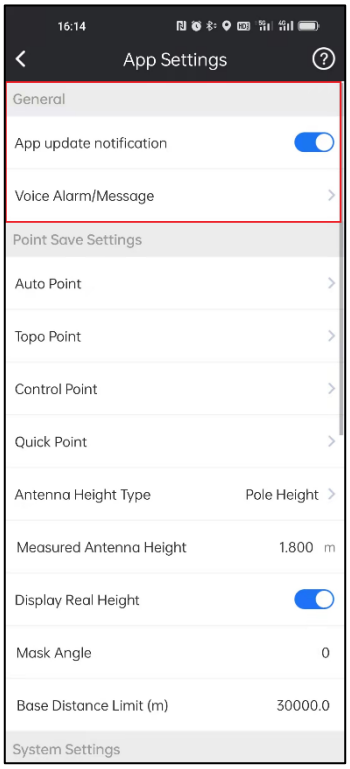


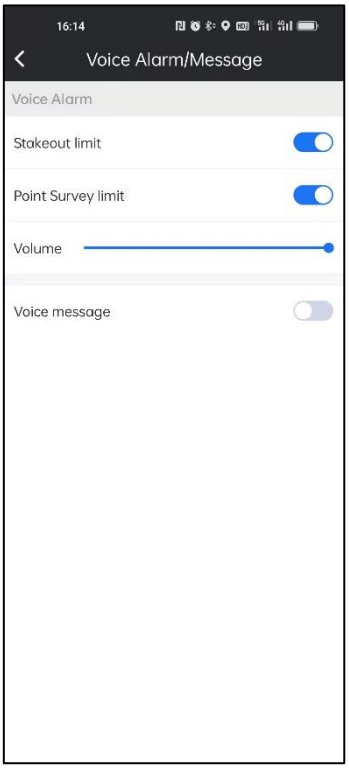
3-7 APP Settings

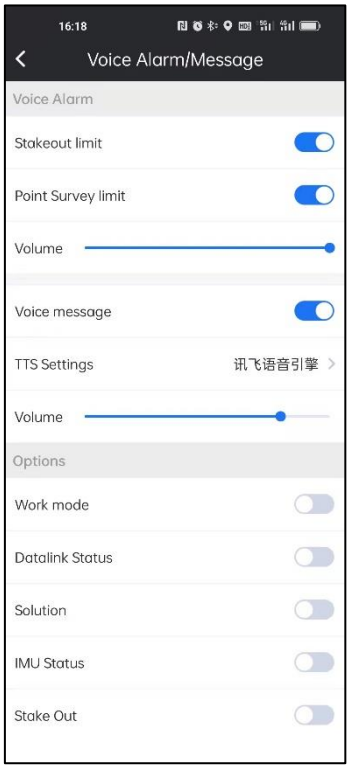
By clicking this, we can set the settings of SurvStar. It contains General, Point Save Settings, System Settings and Display Settings.



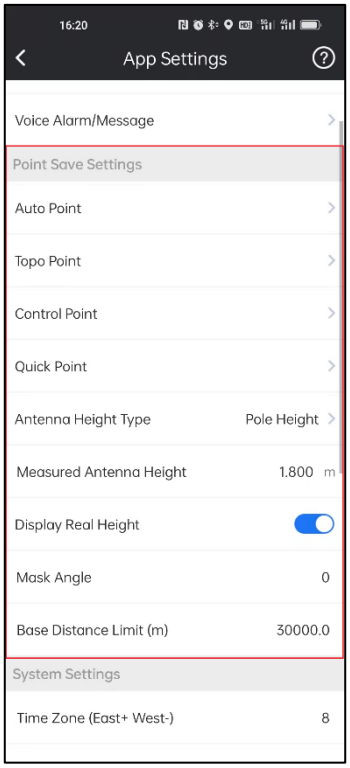
In General, we can set App update notification on/off. And set the Voice Alarm/Message settings. Click Voice Alarm/Message. We can set the voice alarm, volume and set the voice message on/off.

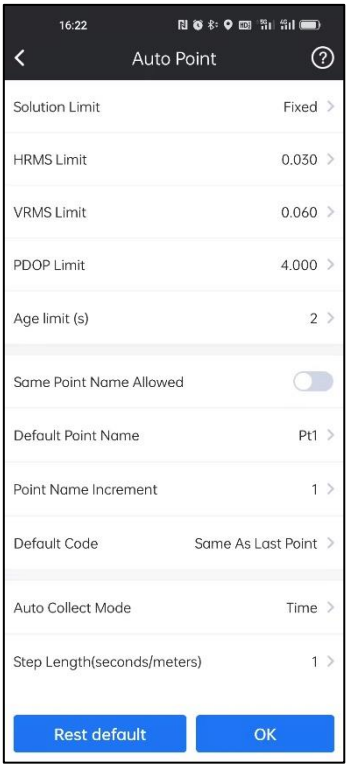


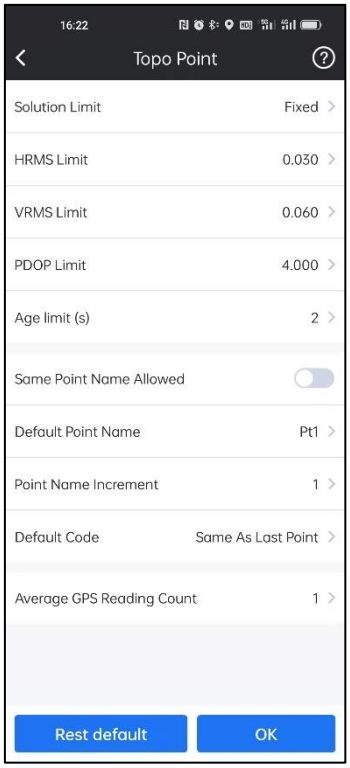


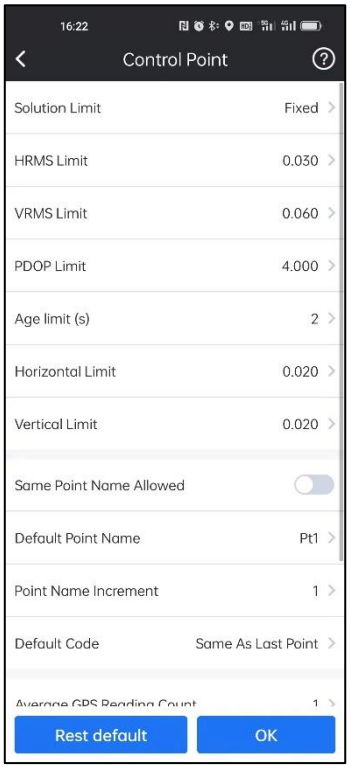


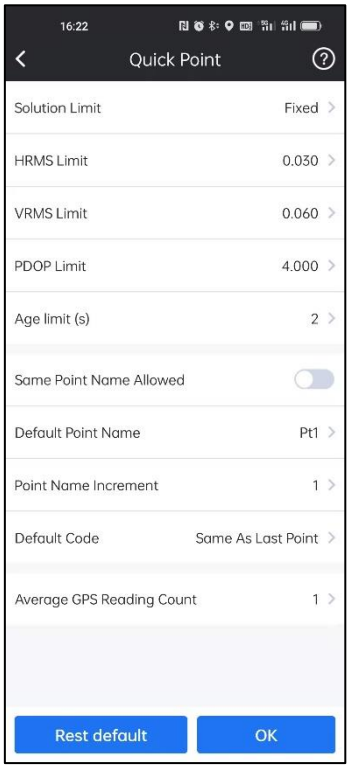
And in Point Save Settings, we can set the settings about survey. We can set limits such as Solution Limit, HRMS Limit, VRMS Limit, PDOP Limit. And other settings in Auto Point, Topo Point, Control Point and Quick Point survey. Set Antenna Height Type and measured value, Mask Angle and Base Distance Limit.



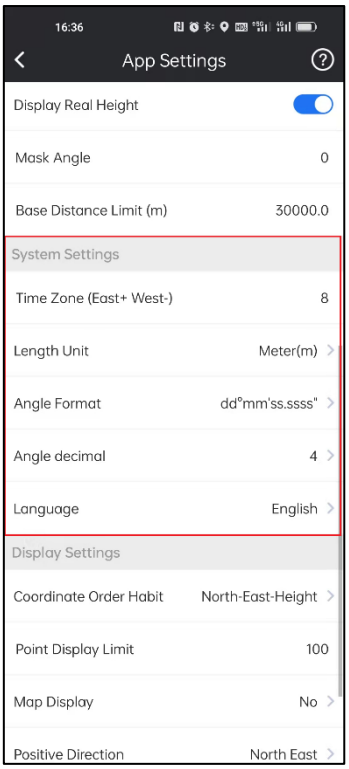




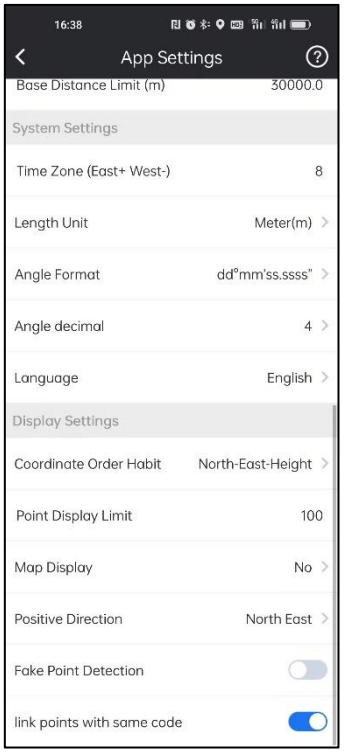




In System Settings, we can set the Time Zone, Length Unit, Angle Format, Angle decimal and Language.

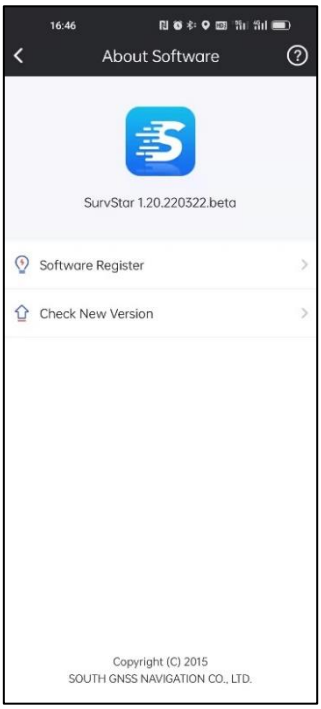


In Display Settings, we can set the Coordinate Order Habit, Point Display Limit, Map Display, Positive Direction. And set Fake Point Detection and link points with same code on/off.



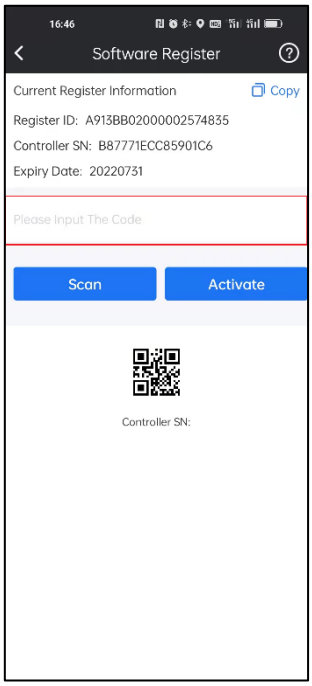
3-8 About Software

By clicking this, we can check the version of SurvStar, register the SurvStar and check new version.

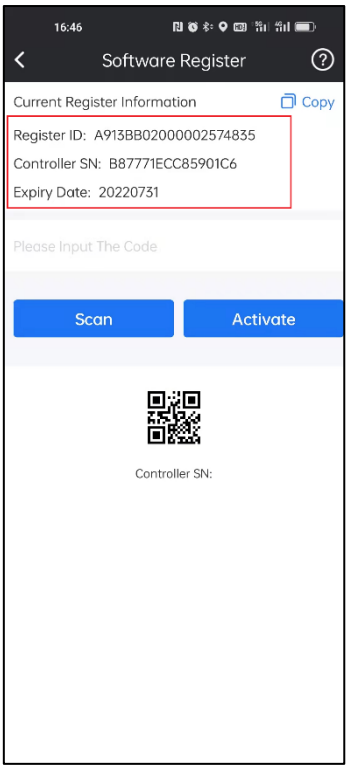


Software Register:

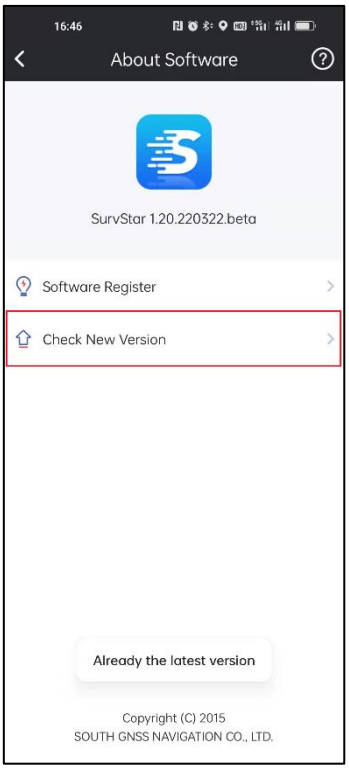
If we get the register code, we can click Software Register, and input the code in the bar, and click Activate.



We can also check the information about the Register ID, Controller SN and Expiry Data. This data is the SurvStar' s using data.



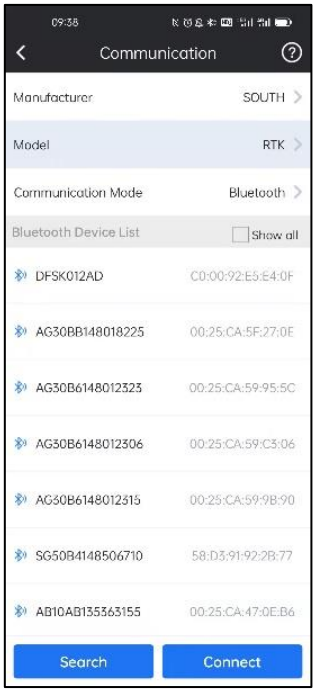
We can click Check New Version to check wheather there is a newer version.



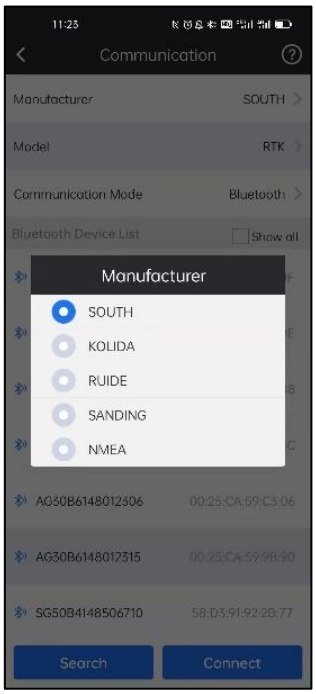
Chapter 4 Device

4-1 Communication

Click Device->Communication or tap the  icon in the top to enter this interface.

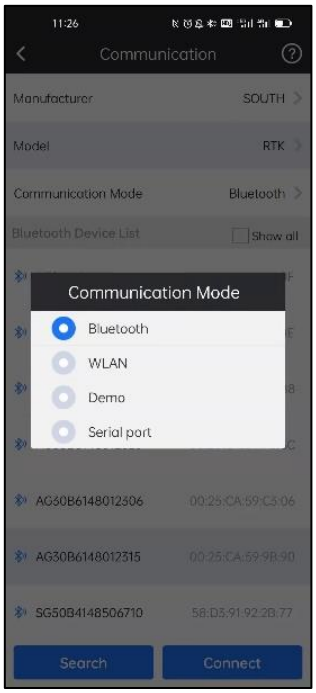


Set the correct Manufacturer.



Select the Communication Mode. There are four kinds of Communication Mode:

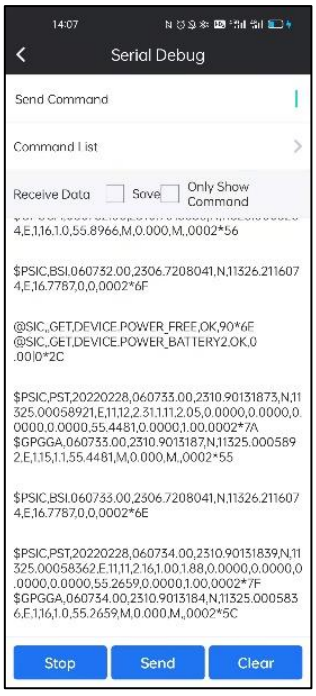
Bluetooth: connect to receiver by Bluetooth. It is the most common used way to connect the receiver.



1.Click Search to detect the Bluetooth devices around us

2. Select the receiver's serial number, and click Connect to connect receiver. The chosen device will highlight with blue.

3.Click Debug to monitor the data stream from the connected receiver.

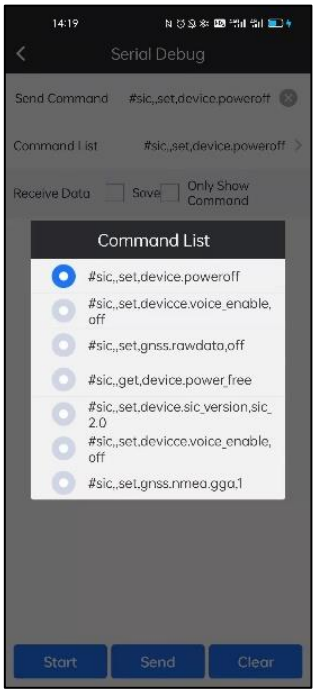


Click Stop or Start to stop/start the data stream from the receiver.

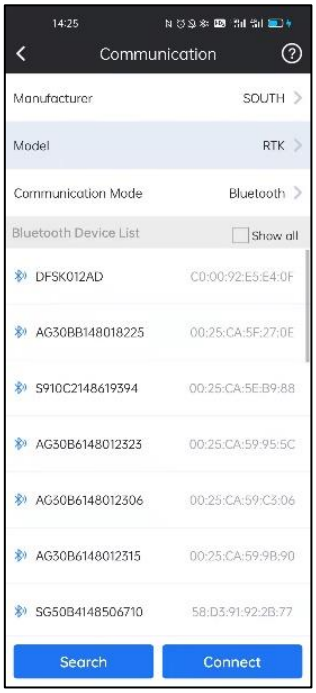
Input the commands at the Send Command bar, and click the Send to send the commands to the receiver.

Click Clear to clear the contents of the page.

There are some useful commands in the Command List bar.

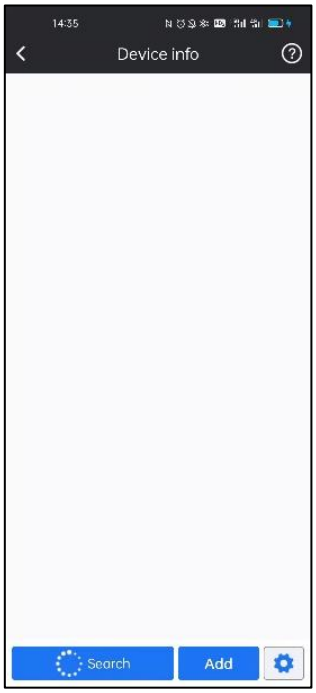


4. Break the blue tooth connection with the receiver by clicking Disconnect.

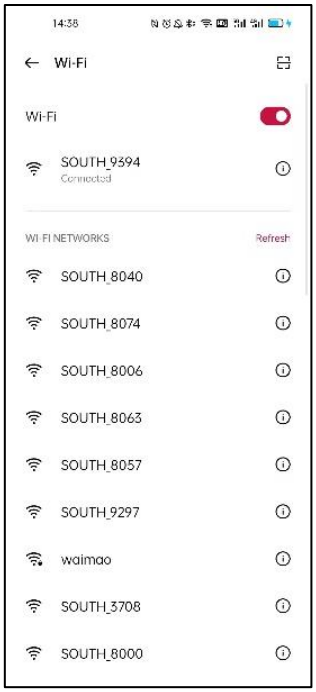


WLAN: connect to receiver by WIFI (It only supports the receiver with WIFI and WEB UI; and while connecting the receiver by WIFI, the android controller won't have access to the internet.)

1.Click the Device list bar to enter this page.

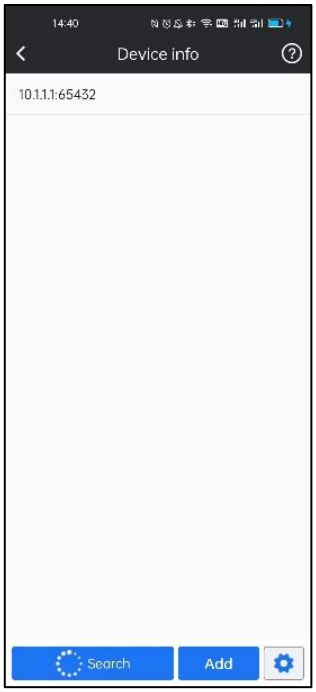


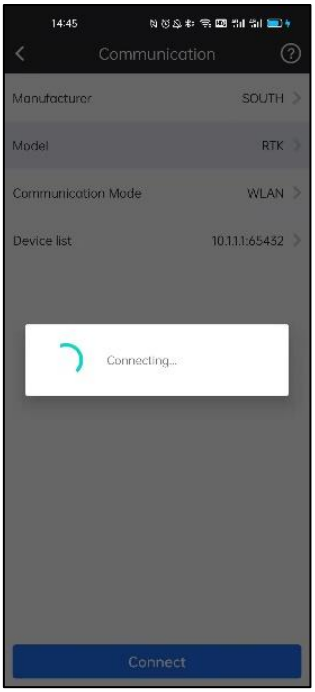
2.Click the settings icon to connect the WLAN of the receiver.



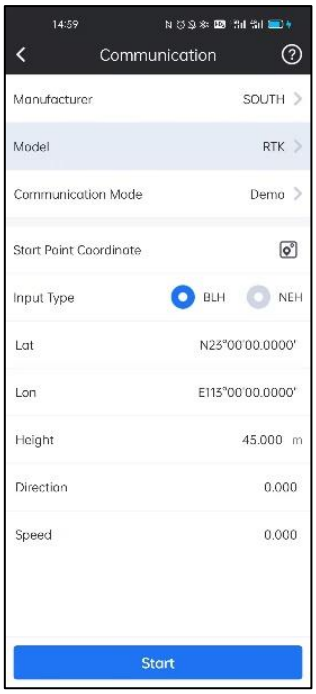
3.Click Add to input the IP:10.1.1.1 and port: 65432.

4.Click this IP information and click Connect. It will connect the receiver.





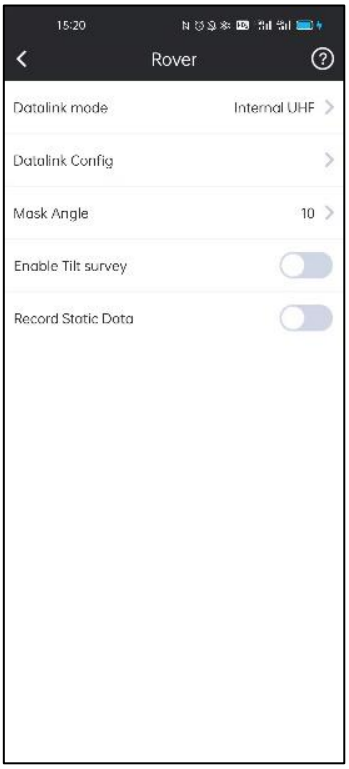
Demo:It is a mode that can connect a virtual receiver which can be used to show the function of the SurvStar. Input the Coordinate of Start Point and click Start.



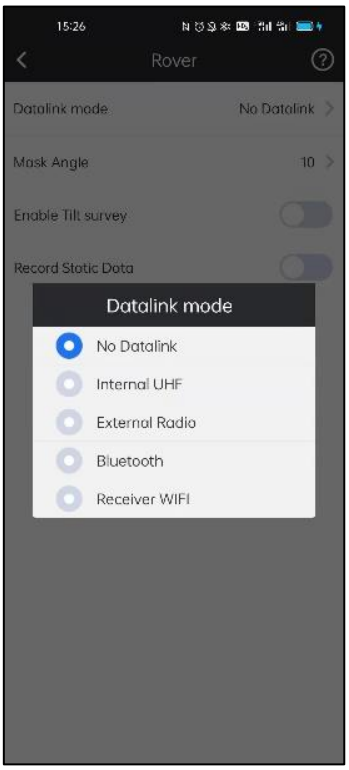
Serial port: connect to the receiver by cable (not used any more)

4-2 Rover Mode

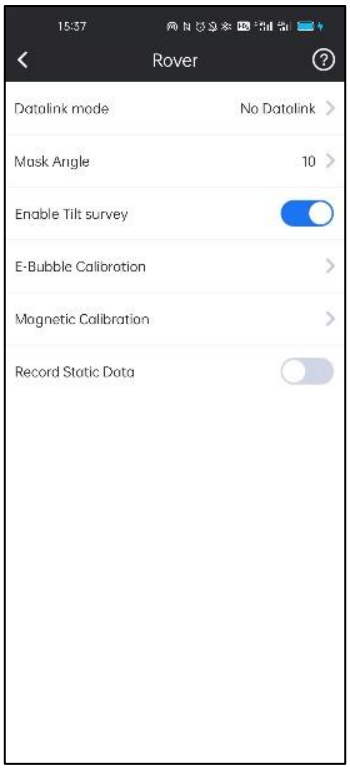
Click Device->Rover to enter the interface of Rover Mode.

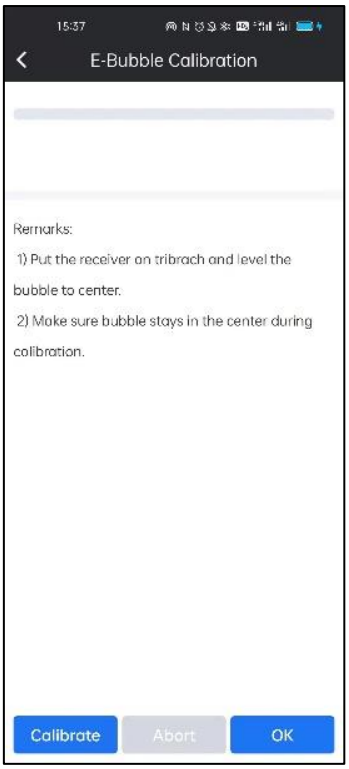


Click the Datalink mode bar, it can set the different datalink mode.

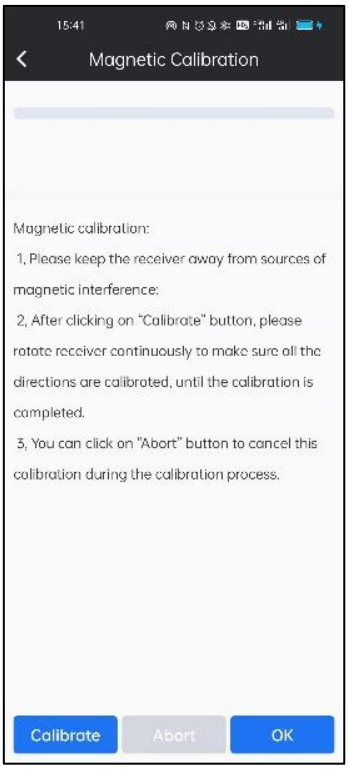


If we want to use the tilt survey, we need to enable the Tilt Survey and do the E-Bubble Calibration.

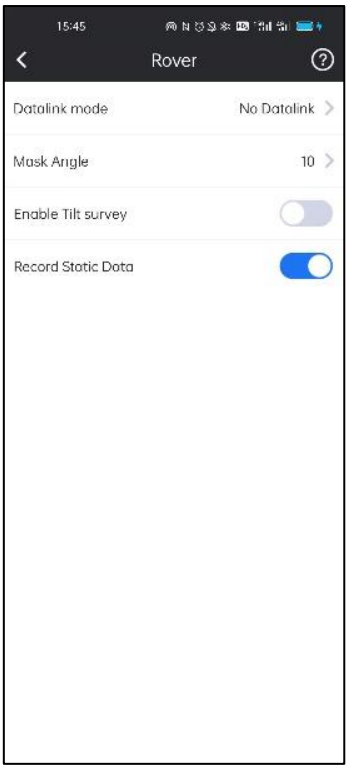




We can also do the Magnetic Calibration by this way.

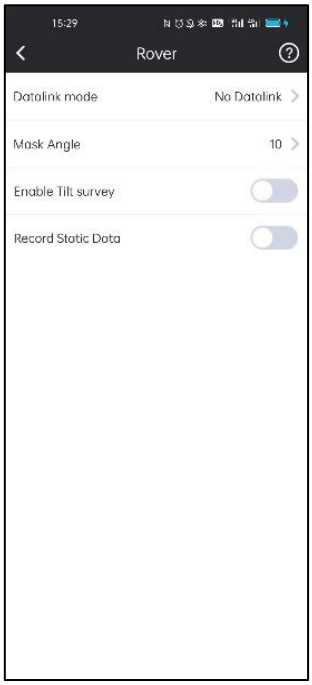


Enable the Record Static Data to record the original observation data(*.sth) of the receiver.



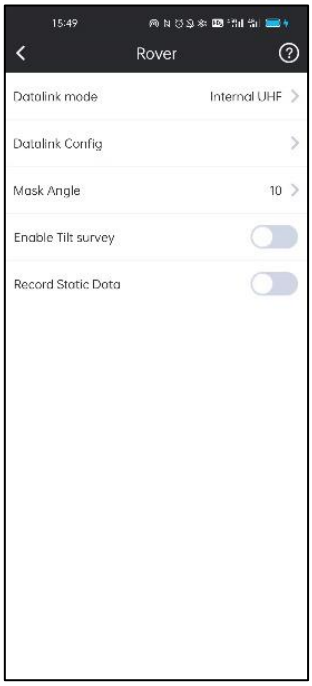
4-2-1 Rover-No Datalink

Click the Datalink mode bar, set the receiver to Rover-No Datalink mode. This mode is used when the data link is not used at all.

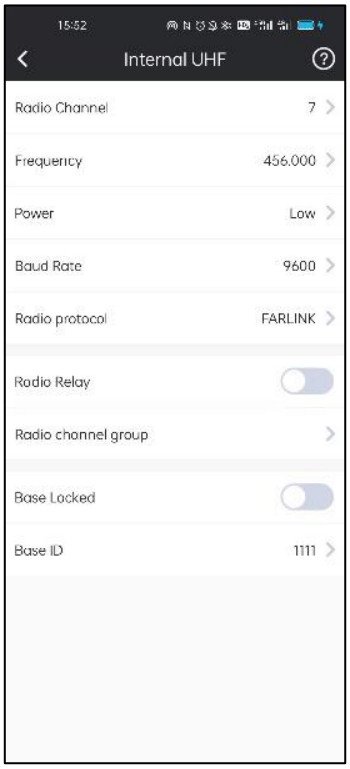


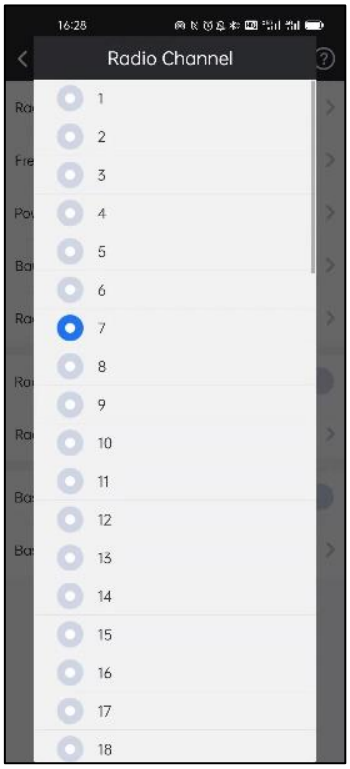
4-2-2 Rover-Internal UHF

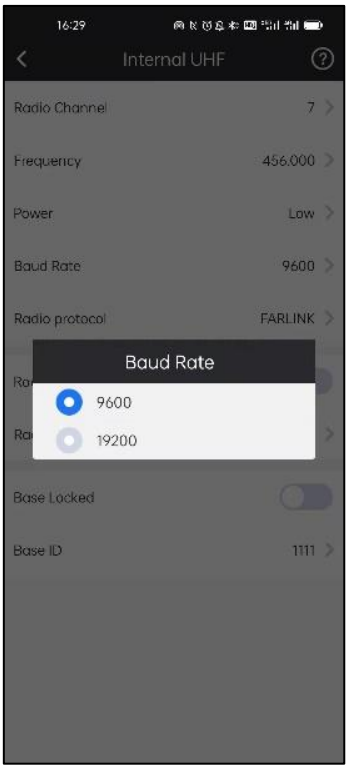
1.Click the Datalink mode bar, set the receiver to Rover- Internal UHF mode.

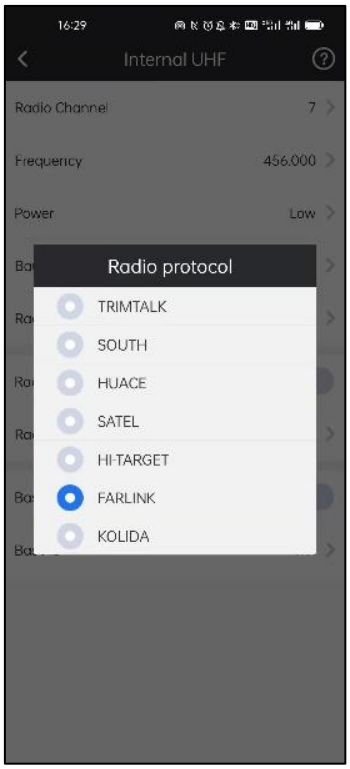


2.Click Datalink Config bar to this page, set the correct Radio Channel, Frequency, Power, Baud Rate and Radio protocol, which should be the same as the base's radio parameters.







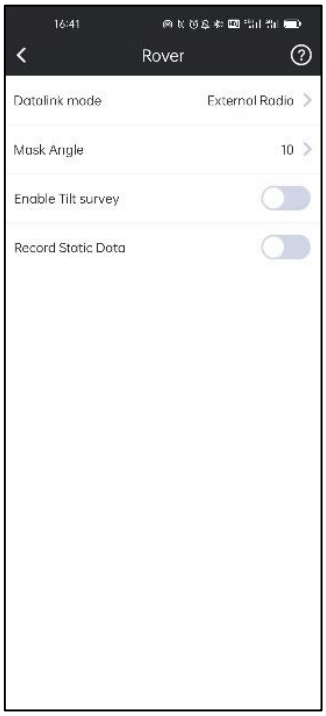


3.After that we can go to SAT information to check the base information.

4-2-3 Rover-External Radio

1. Connect the receiver to external radio.

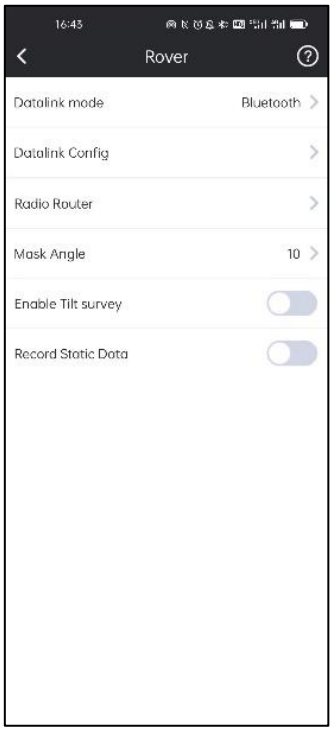
2. Click the Datalink mode bar, set the receiver to Rover- External UHF mode.



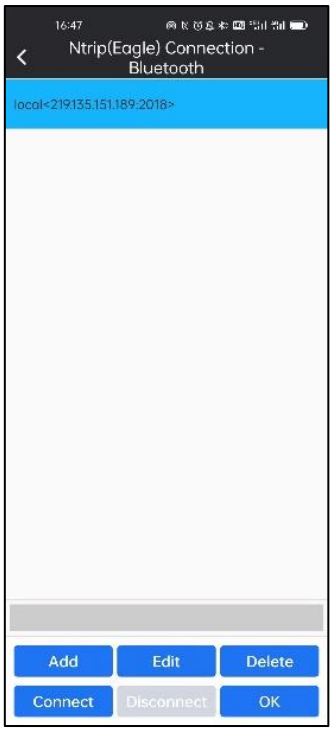
3. Config the external radio the same as base UHF.

4-2-4 Rover-Bluetooth Data Link

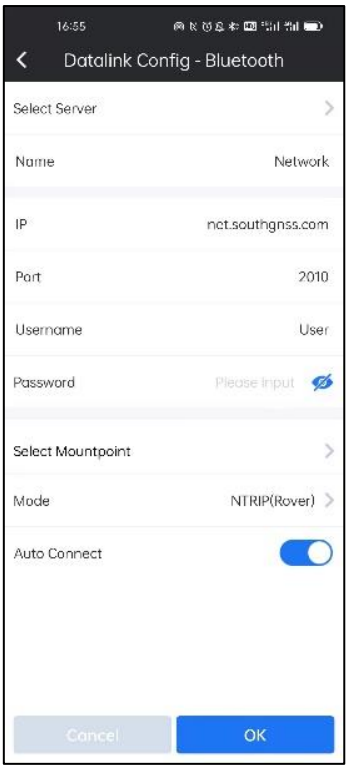
1.Click the Datalink mode bar, set the receiver to Bluetooth mode.



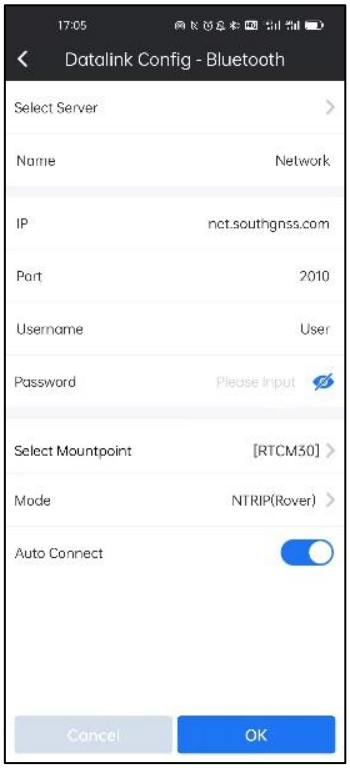
2.Click the Datalink Config bar to enter the Ntrip(Eagle) Connection-Bluetooth page.



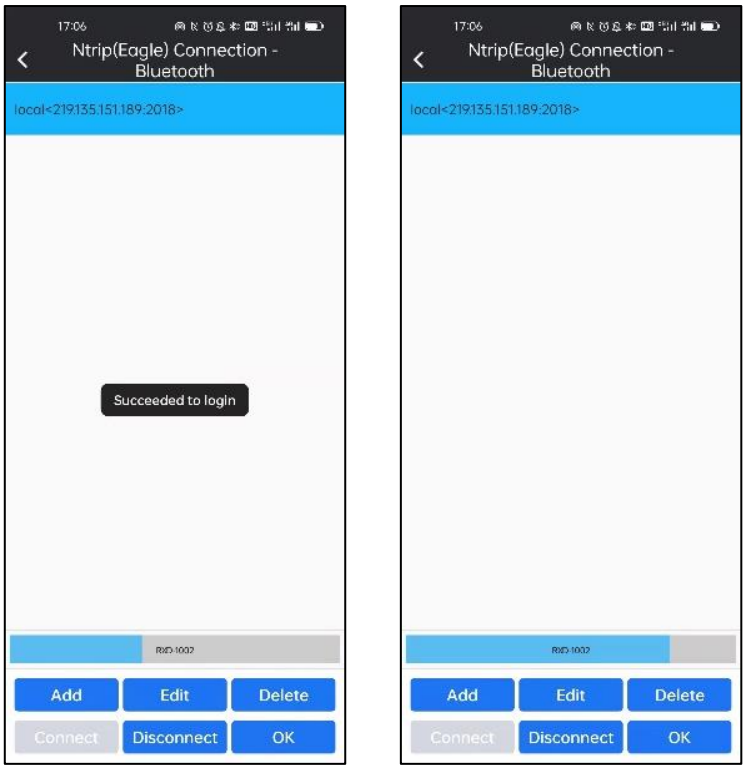
3.Click Add to add the Datalink. Set the correct Name, IP, Port, Username and Password.



4.Click Select Mountpoint bar, and then click Refresh Mountpoints in the popped up window. Then click and set the correct mountpoint. Click OK.



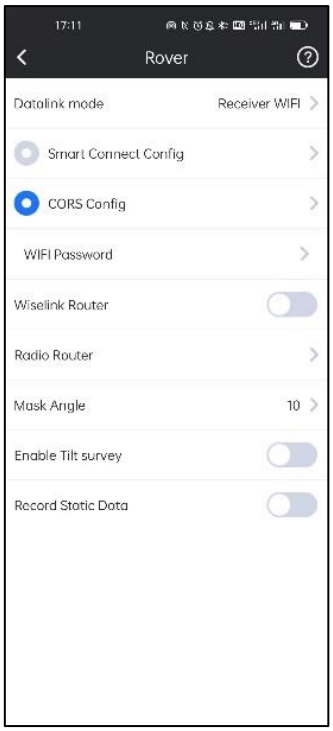
4. Click the correct IP information and click Connect, the progress bar shows the data stream.



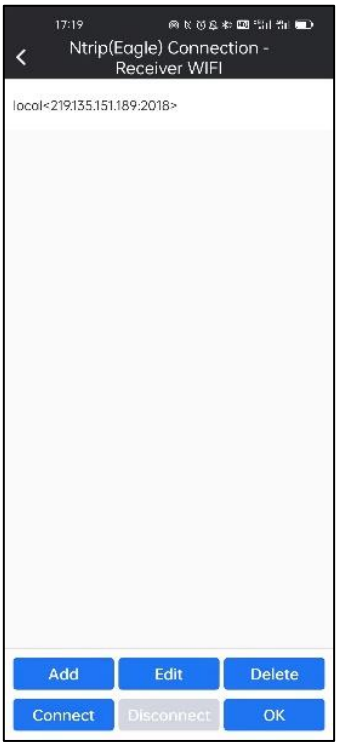
4-2-5 Rover-Receiver Network

Insert SIM card into the receiver and connect receiver with a network antenna if needed.

1.Click the Datalink mode bar, set the receiver to the Receiver WIFI mode.



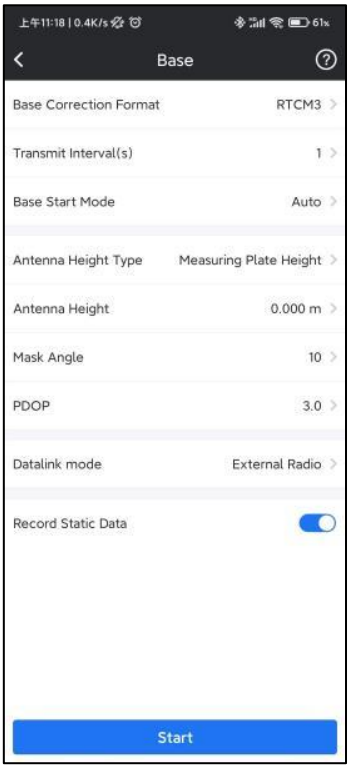
2.Click the CORS Config bar to enter the Ntrip(Eagle) Connection-Receiver WIFI page.



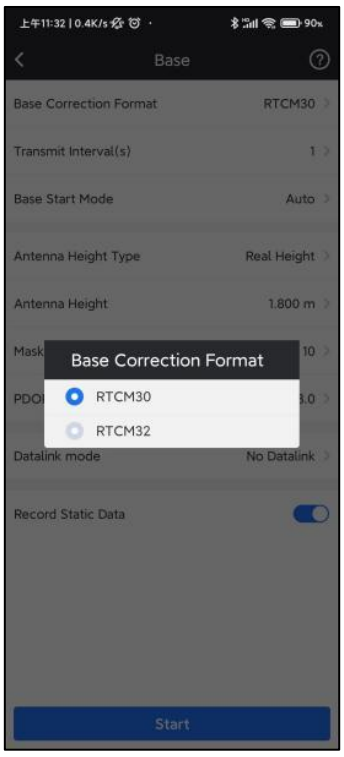
3.Click Add to add the Datalink. The steps are same as the Bluetooth Datalink.

4-3 Base Mode

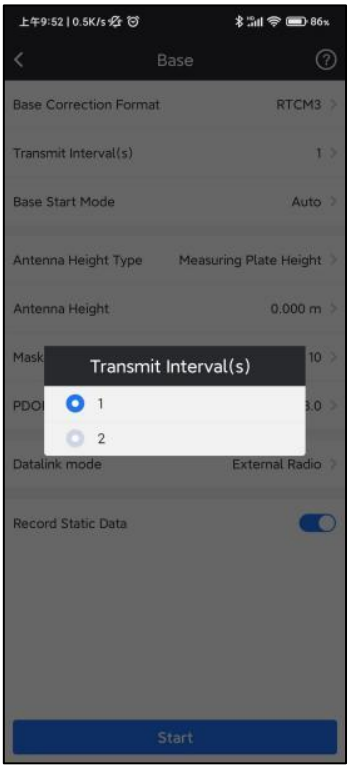
Click the Device-Base enter interface of Base mode.



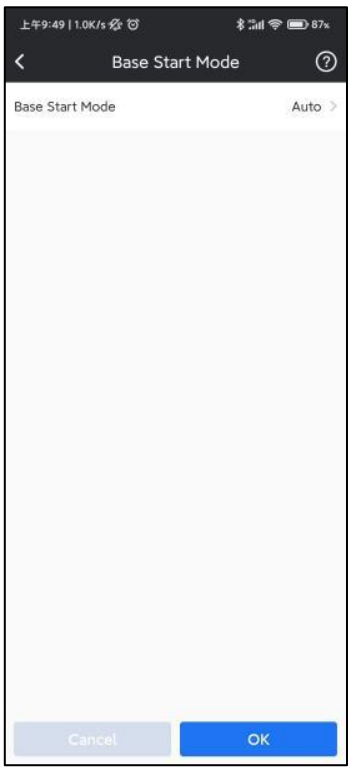
1.Click the Base Correction Format bar of Base, set the difference scheme for receiver.

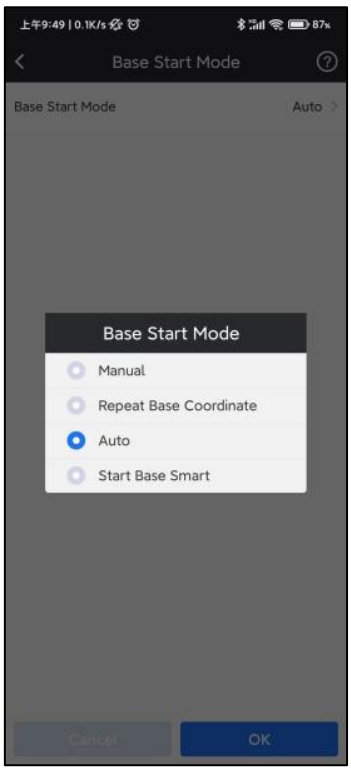


2.Click the Transmit Interval(s) bar to set the time of data transmit interval.

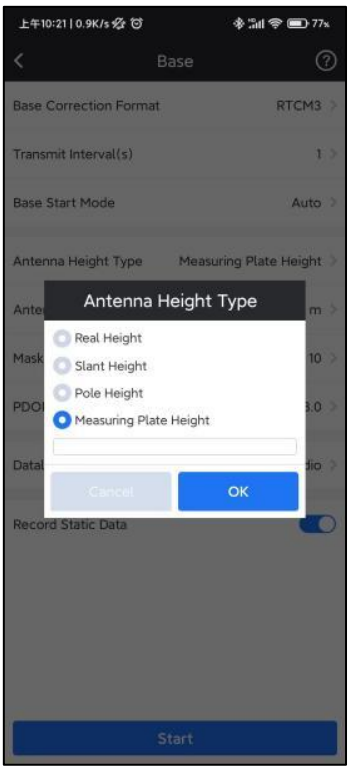


3.Click the Base Start Mode bar to set mode of base start. Base start mode contains Manual, Repeat Base coordinate, Auto and Start Base Smart. Click OK.

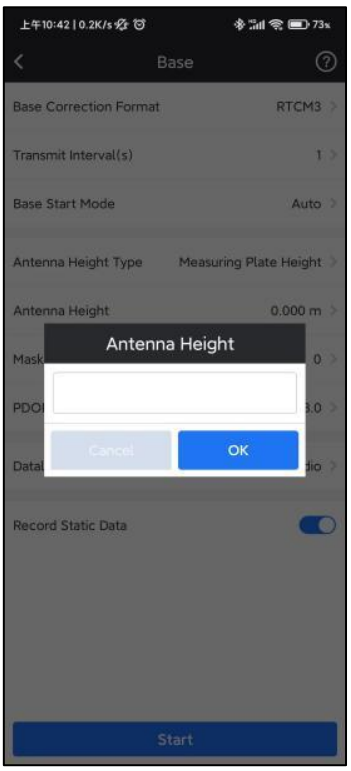




4.Click the Antenna Height Type bar to set antenna height type of receiver. The type contains Real Height, Slant Height, Pole Height and Measuring Plate Height. Click OK.

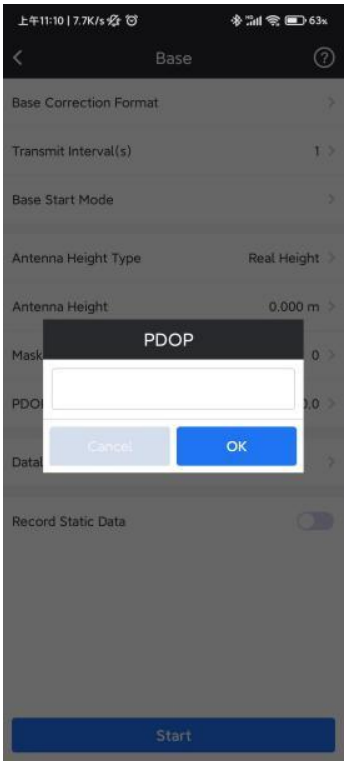


5.Click the Antenna Height bar and input the antenna height then click OK.



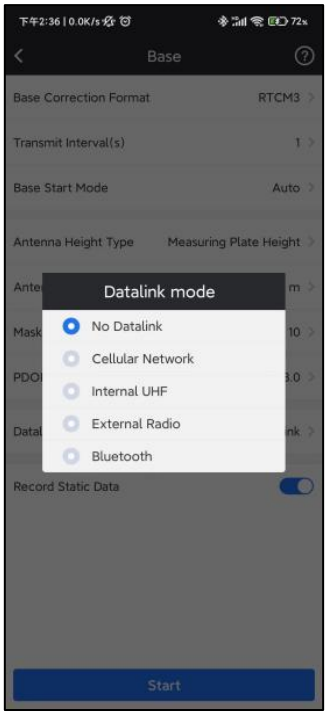
6.Click the Mask Angle bar and input the receiver mask angle then click OK.

7.Click the PDOP bar and input PDOP value then click OK. The usual default value is 3.0.



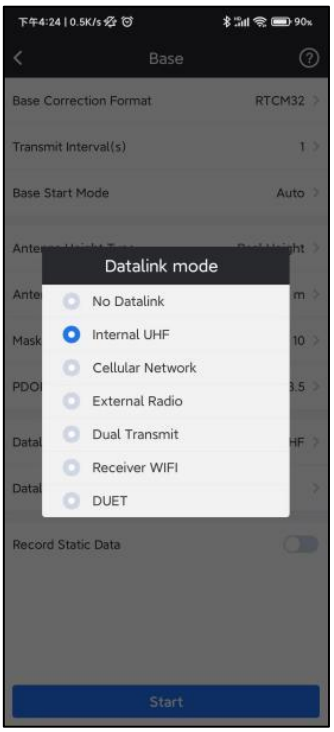
4-3-1 Base-No Datalink

Click the Datalink mode bar, set the receiver to Base-No Datalink mode. This mode is used when the data link is not used at all.

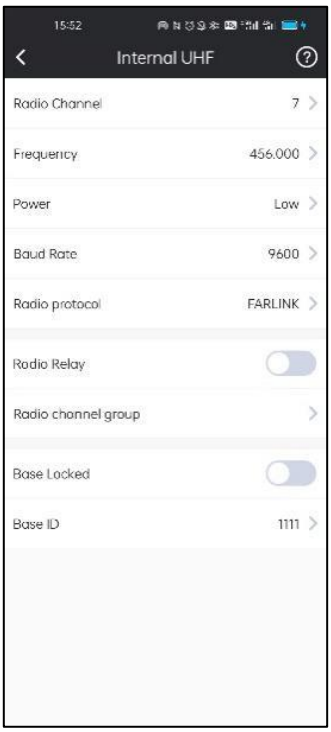


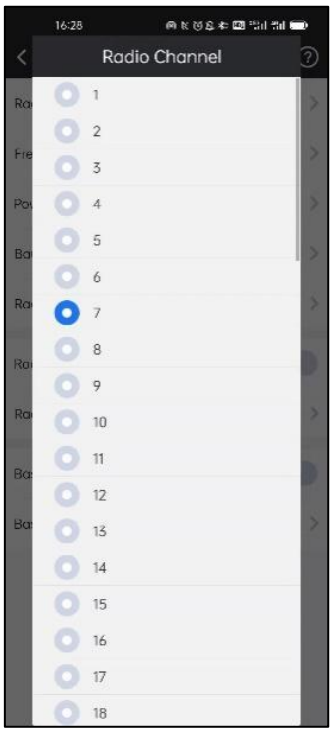
4-3-2 Base-Internal UHF

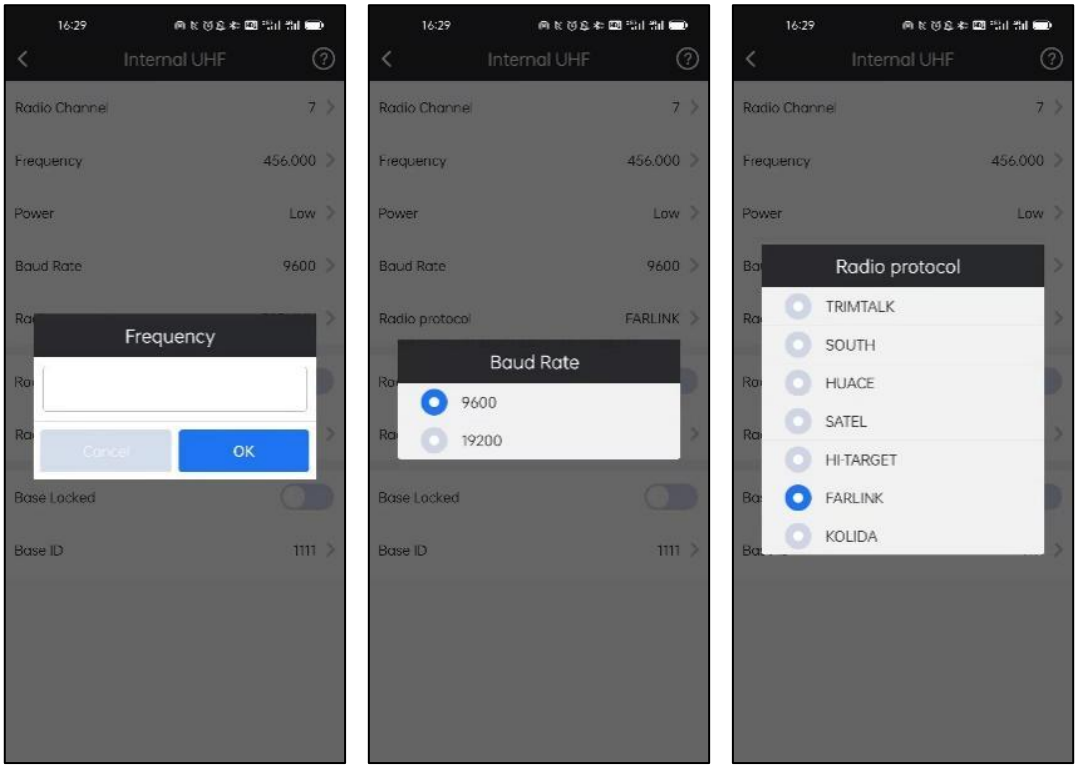
1.Click the Datalink mode bar, set the receiver to Base-Internal UHF mode.



2.Click Datalink Config bar to this page, set the correct Radio Channel, Frequency, Power, Baud Rate and Radio protocol, which should be the same as the base's radio parameters.

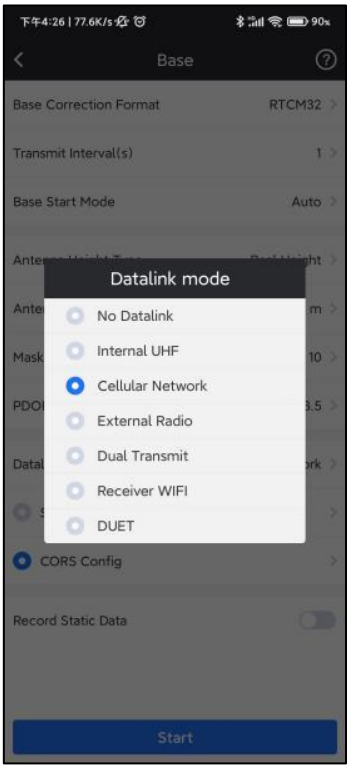




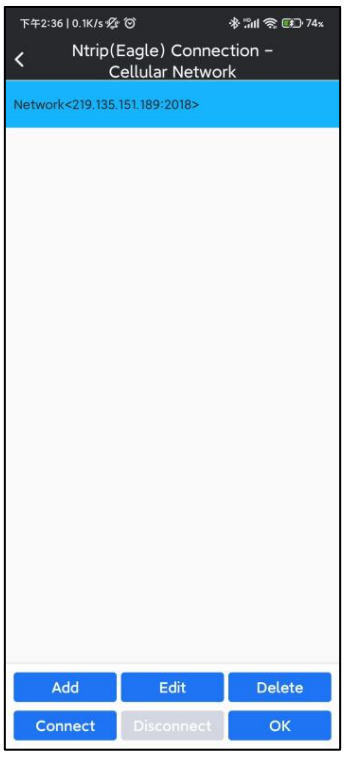

16:29
Internal UHF
Radio Channel 7
Frequency 456.000
Power Low
Baud Rate 9600
Frequency
Cancel
OK
Base Locked
Base ID 1111
16:29
Internal UHF
Radio Channel 7
Frequency 456.000
Power Low
Baud Rate 9600
Radio protocol FARLINK
Baud Rate
9600
19200
Base Locked
Base ID 1111
16:29
Internal UHF
Radio Channel 7
Frequency 456.000
Power Low
Radio protocol
TRIMTALK
SOUTH
HUACE
SATEL
HI-TARGET
FARLINK
KOLIDA

4-3-3 Base-Cellular Network

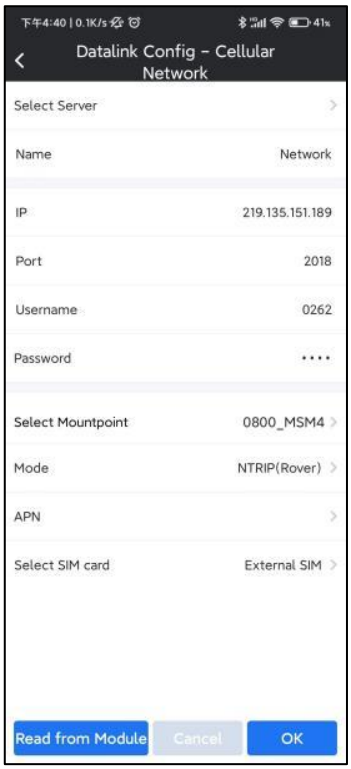
1.Click the Datalink mode bar, set the receiver to Base-Cellular Network mode.

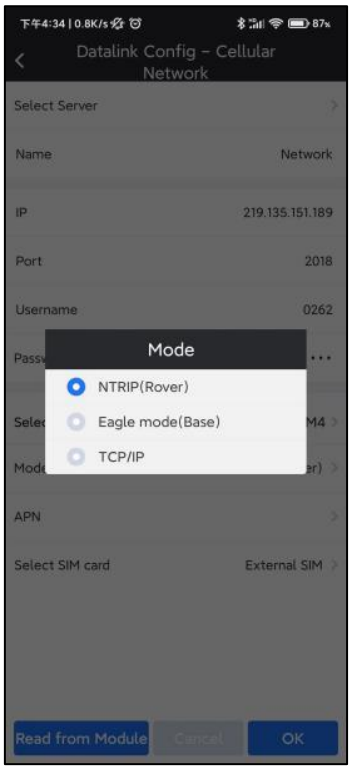


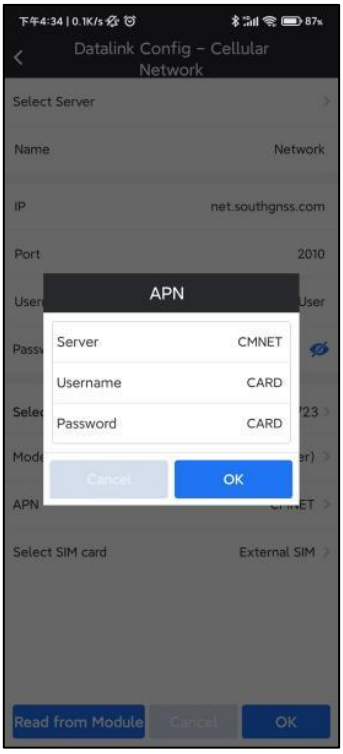
2.Click the Datalink Config bar to enter the Ntrip(Eagle) Connection-Cellular Network page.

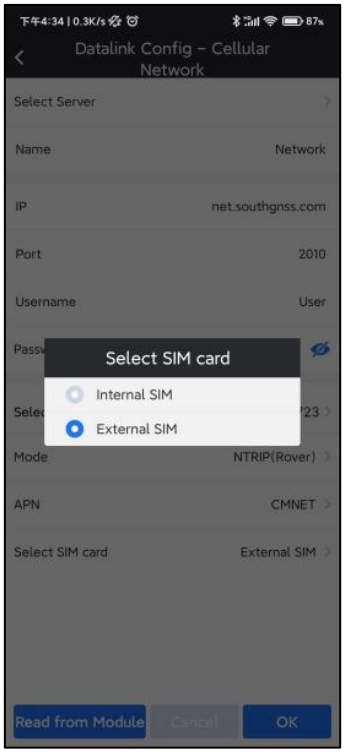


3.Click Add to add the Datalink. Set the correct Name, IP, Port, Username and Password. Click the Read from Module on lower left corner can auto to obtain IP, Port, Username and Password. User can click Select Mountpoint Mode APN and Select SIM card bar to set a correct Select Mountpoint, Mode, APN and Select SIM Card of cellular network. Once set, click OK.

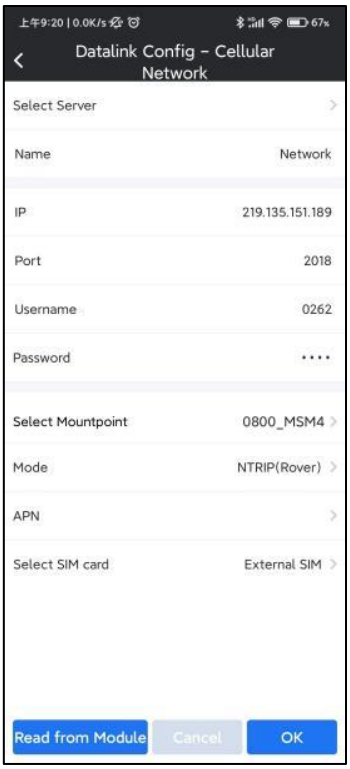




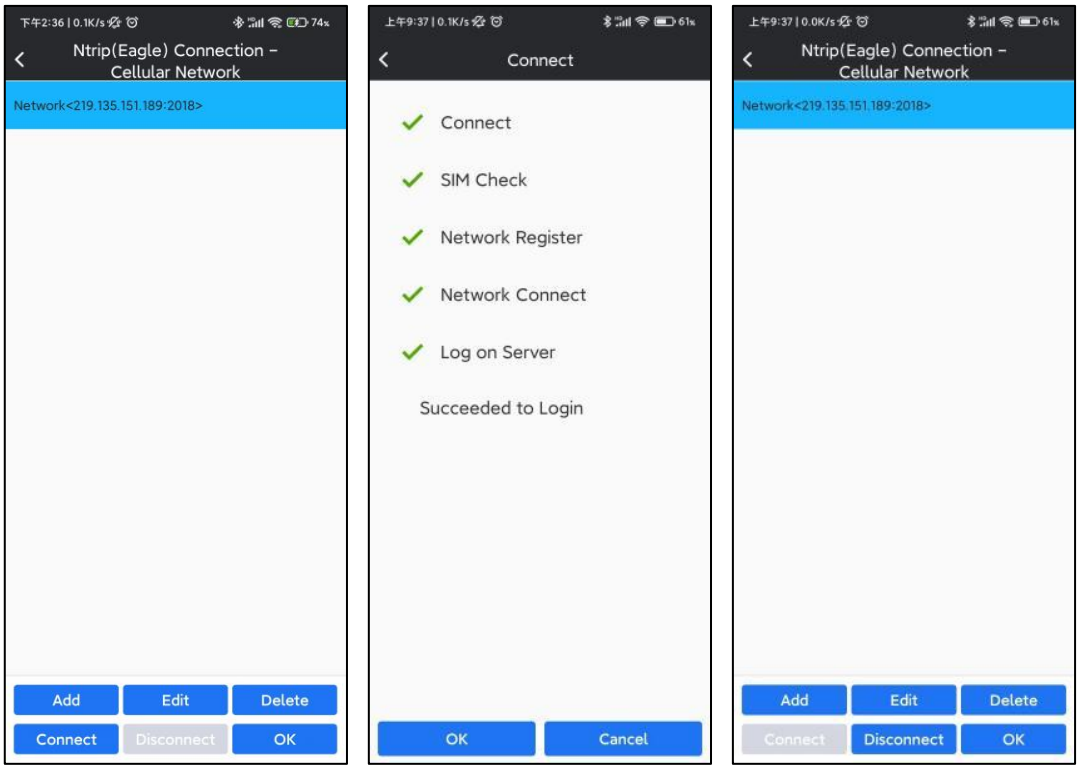




4.Click Edit bar to edit Cellular Network. Enter the Datalink Config-Cellular Network page, it's similar to Add function.



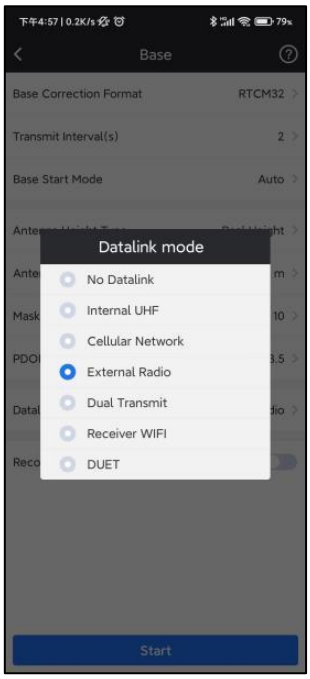
5.Once set, click Connect bar to connect cellular network.



4-3-4 Base-External Radio

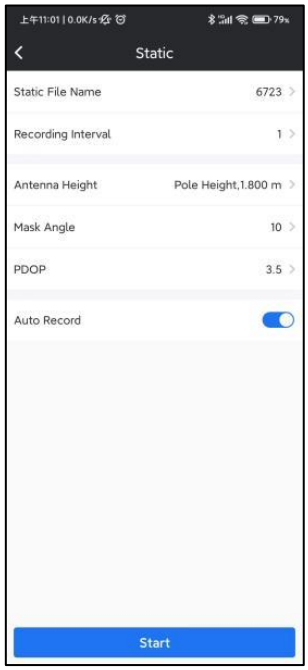
1. Connect the receiver to external radio.

2. Click the Datalink mode bar, set the receiver to Base-External Radio mode.



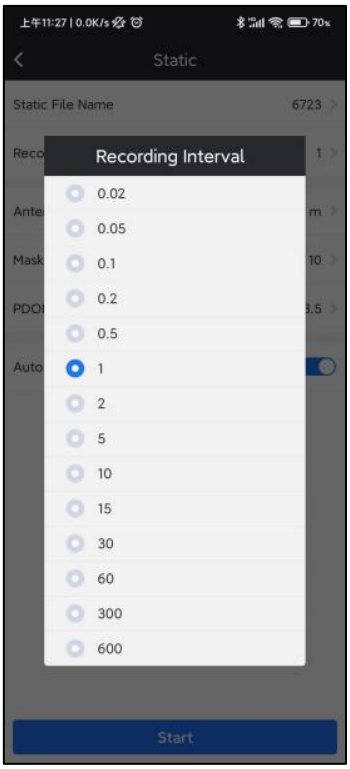
4-4 Static Mode

Click the Device interface to enter Static Mode.

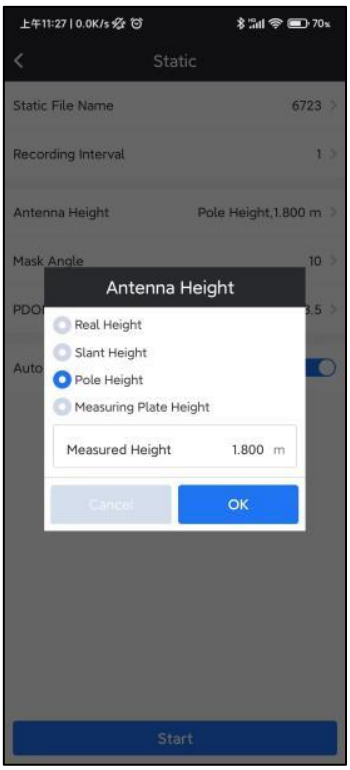


1.Click the Static File Name bar to set the name of static file.

2.Click the Recording Interval bar to set the static data collect interval time(s).



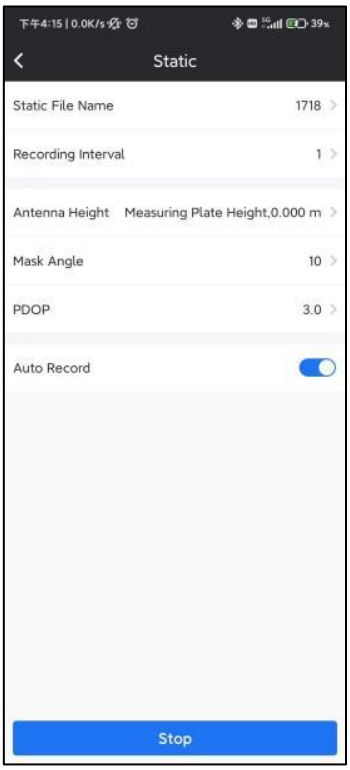
3.Click the Antenna Height bar to set the Real Height, Slant Height, Pole Height, and Measuring Plate Height. Click OK.



4.Click the Mask Angle bar and input the receiver mask angle then click OK.

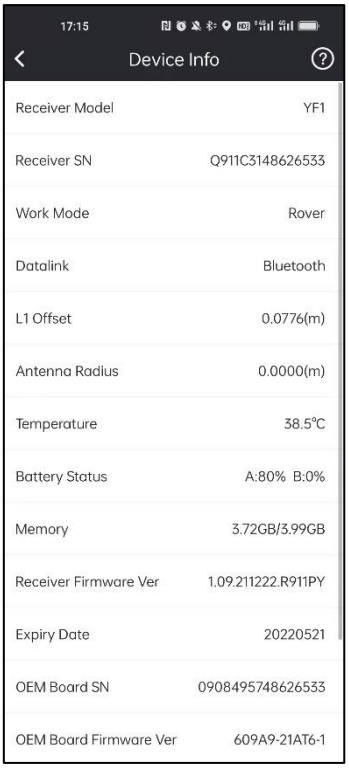
5.Click the PDOP bar and input PDOP value then click OK. The usual default value is 3.0.

6.Click Static mode auto collect data when open the Auto Record.



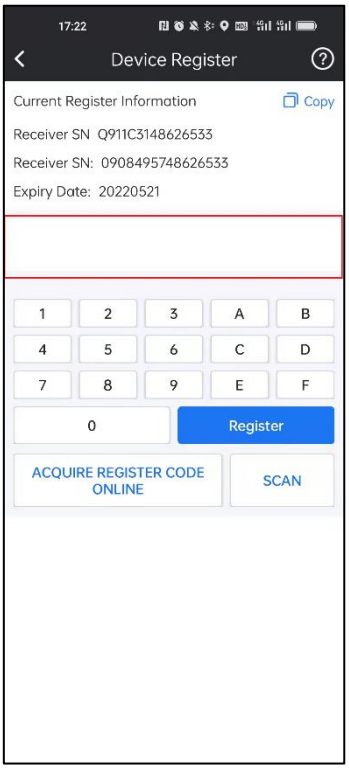
4-5 Device Info

By clicking this, we can check the information of the device. It includes Receiver Model, Receiver SN, Work Mode, Datalink, L1 Offset, Antenna Radius, Temperature of the device, Battery Status, Memory, Receiver Firmware Version, Expiry Data, OEM Board SN, OEM Board Firmware Version, UHF Module SN and UHF Module Firmware Version.



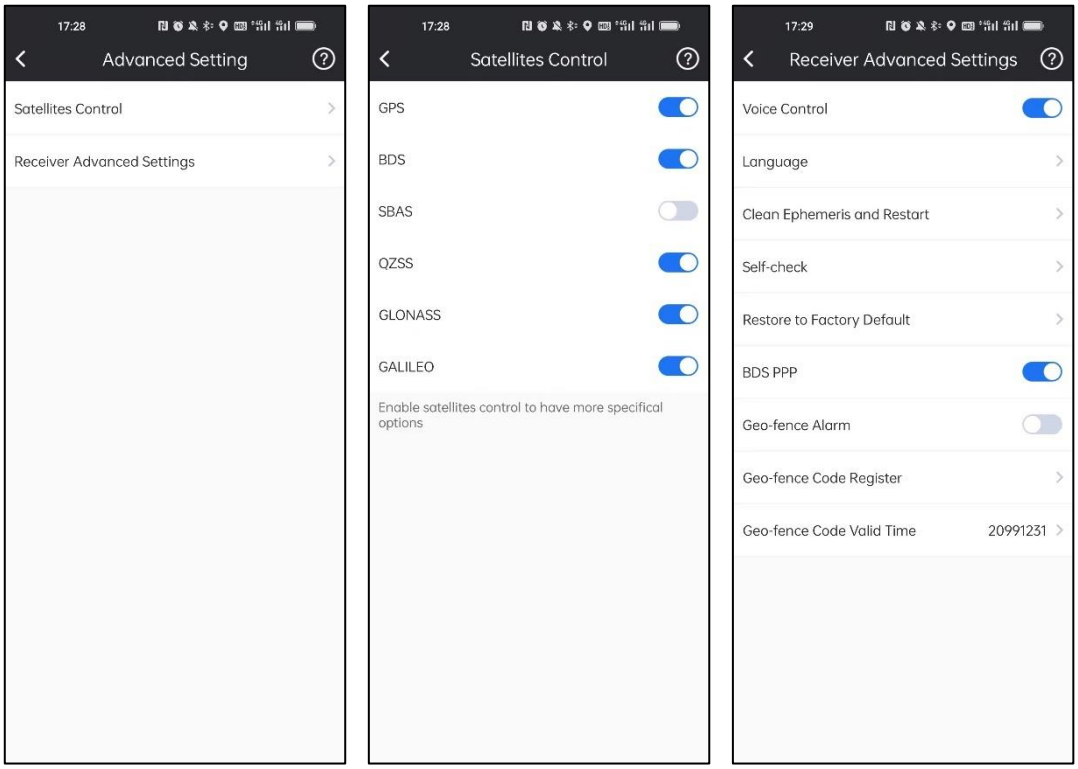
4-6 Device Register

By clicking this, we will enter to Device Register page. In this page, we can check the device registration information and register device. Click Copy will copy the receiver SN. Input the registration code in the bar, and click Register, then the device will be registered. We can also click SCAN to scan the QR code to register.



4-7 Advanced Setting

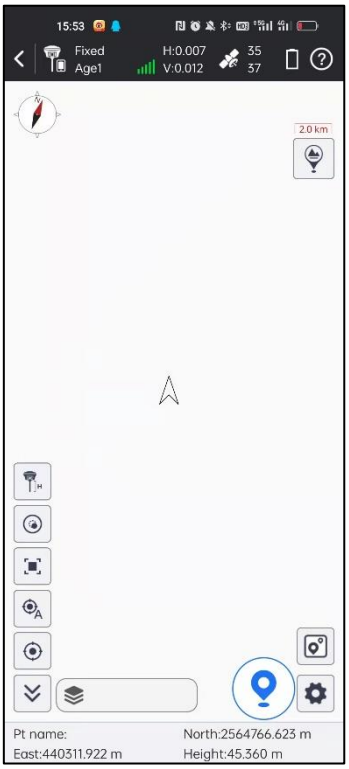
By clicking this, we will enter to Advanced Setting page. In this page, we can control weather track one satellite system and set the settings of the receiver. We can set the Voice of the device, Language of the device, Clean Ephemeris, Self-check, Restore to Factory Default and so on.



Chapter 5 Survey

5-1 Point Survey

By clicking this, we can enter to the point survey page.



In this page, the icons in upper toolbar describe as follows:

 : Close/exit Point Survey page.

 : Receiver operation mode, pressing to jump to Base/Rover/Static setting page.

 : Receiver signal.

 : Receiver positioning information, pressing to jump to satellite positioning information page.

 : Receiver battery power.

Solution status: includes single, float, differential and fixed.

Age1: current differential delay is 1.

e.g., Single, 0: current solution is single, and differential delay is 0.

Fixed, 1: current solution is fixed, and differential delay is 1.

H: HRMS, the value represents the horizontal accuracy of current point.

V: VRMS, the value represents the vertical accuracy of current point.

35/37: current number of satellites which used to solution, and the total tracked satellites number.

The icons in left toolbar describe as follows:

 Go Map Center

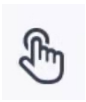
 Auto Map Center

 Full Map

 Tilt Survey

 Antenna Parameter

 Auto Zoom

 Screen Survey

 Map Display

 Coordinate Converter

 Perimeter and Area

 Static Record

 Coordinate Inverse

 Offset Distance/angle

 Slope Distance

 Angle Calculation

 Intersection

 Resection

 Forward Intersection

 Coordinate Traverse

 Offset Point

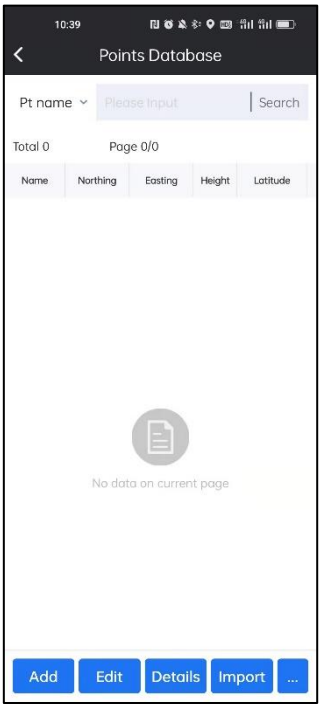
 Divide Line Equally

 Compass

 Pt, Code, H Display

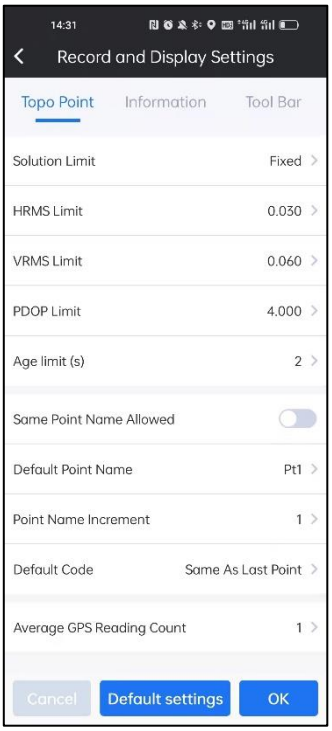
The icons in right toolbar describe as follows:

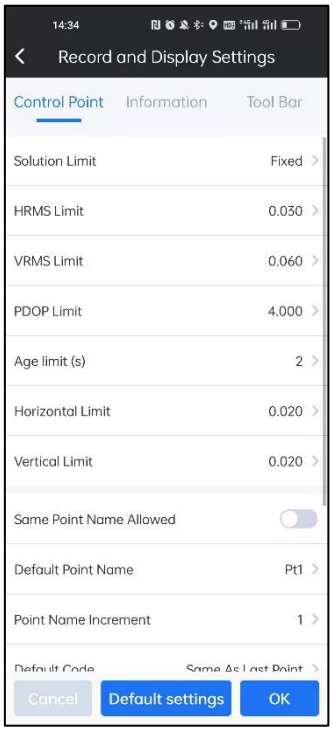
 Coordinate point database. Points collected by SurvStar are stored in coordinate point database.

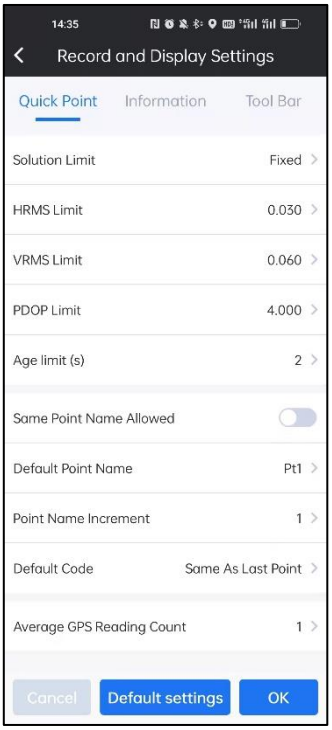


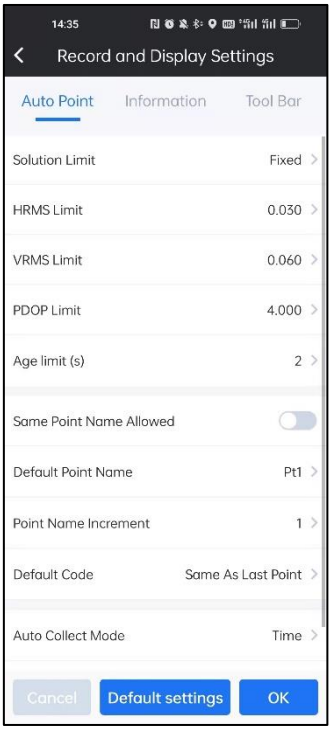
 Record and Display Settings.

Topo/Control/Quick/Auto Point: settings for display limit of collected points on the basis of set point type that defaults to topo points. It can be Topo/Control/Quick/Auto.



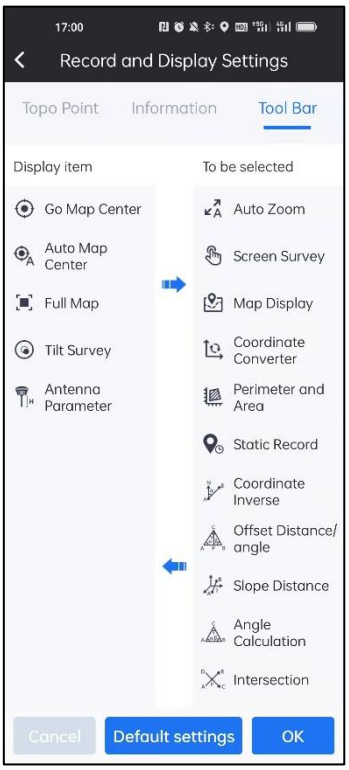






Information: it can select the displayed information in the status bar at interface bottom. Select an item in the to be selected list, then click  to move this item to the Display item list. In the same way, select an item on the Display item list, and click  to move this item to the to be selected list. If click Default settings, the default items will be added to the Display item list, including Pt name, North, East, Height.

Tool Bar: settings what function keys to display in left toolbar in Point Survey interface.



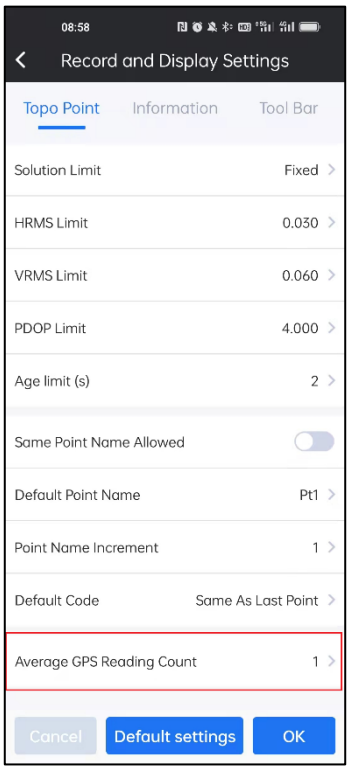
 : Collect point coordinates: this icon changes along with open/close status of tilt survey. Open tilt survey, it will change to  . And if the tilt mode available, it will change to  .

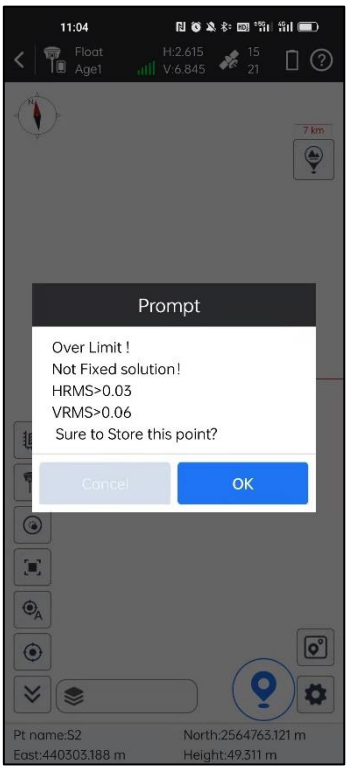
 : set the point type (Topo Point, Control Point, Quick Point, Auto Point). The following introduces collecting process of all point types.

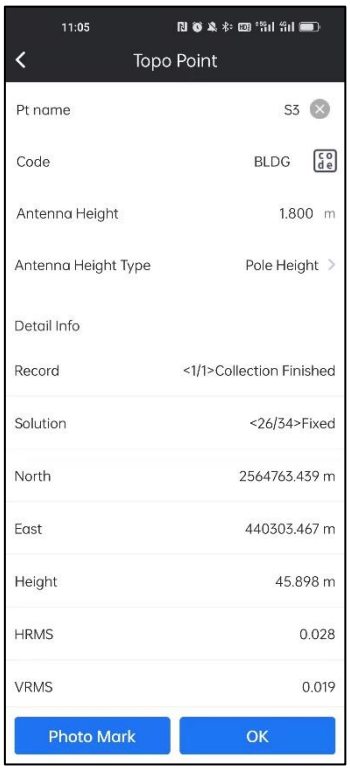
Topo points: 

The “Average GPS Recoding Count” in record options refers to the number of points which could be consecutive recorded. It means that it could collect one point every time and this point should meet record limit. When you click  to record the topo point, if the measured point does not meet record limit, there will be a prompt message. If the measured point meets record limit, the measured point info (HRMS, VRMS, delay, PDOP, date and time) will be displayed in the screen. Then click OK to save the topo

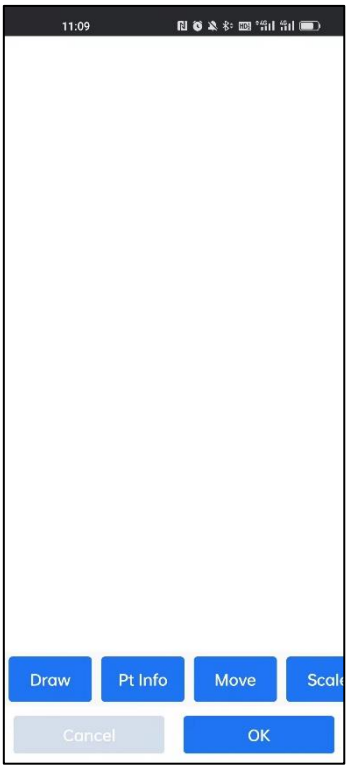
point.



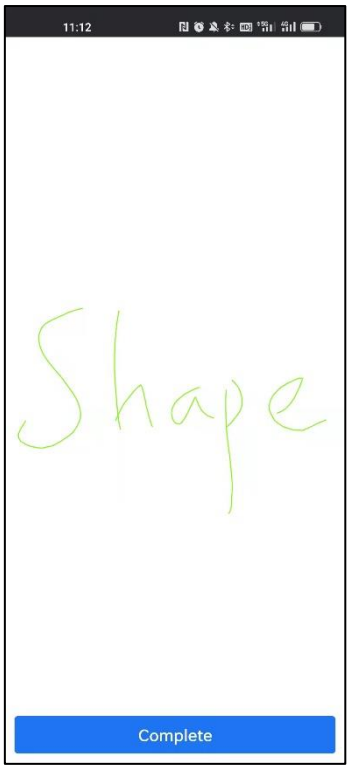




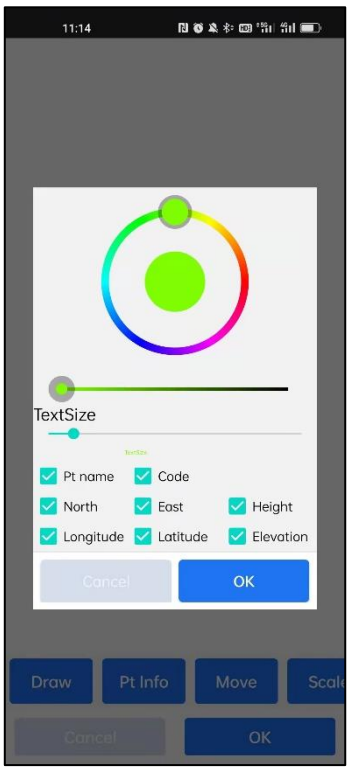
Click Photo Mark, we can make information note on collected points, such as documents, pictures and graphs

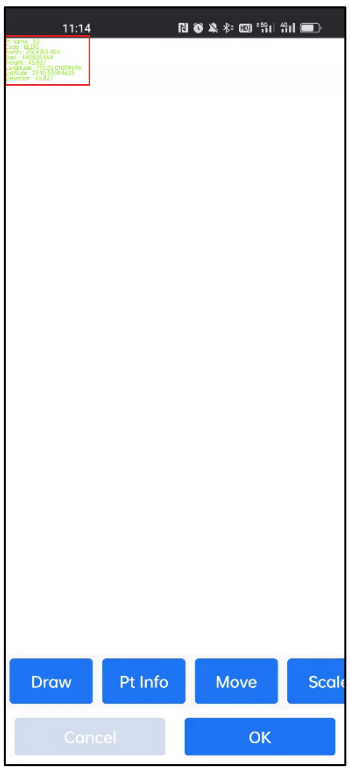


Click Draw, we need to choose the color of the draw line firstly. And we can draw the shape we need.

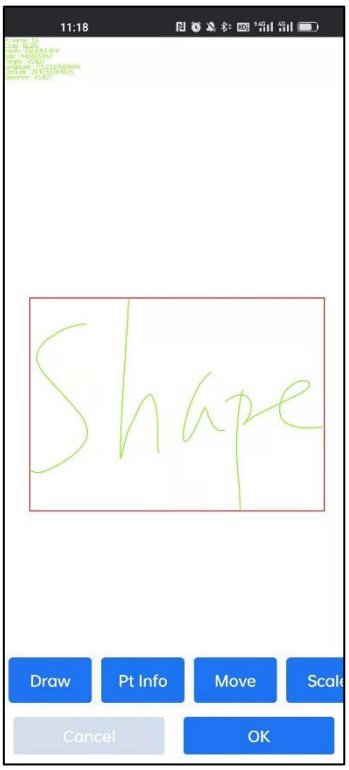


Click Pt Info, we can label the photo information. We can select to on/off Pt name, Code, North, East, Height, Longitude, Latitude and Elevation.

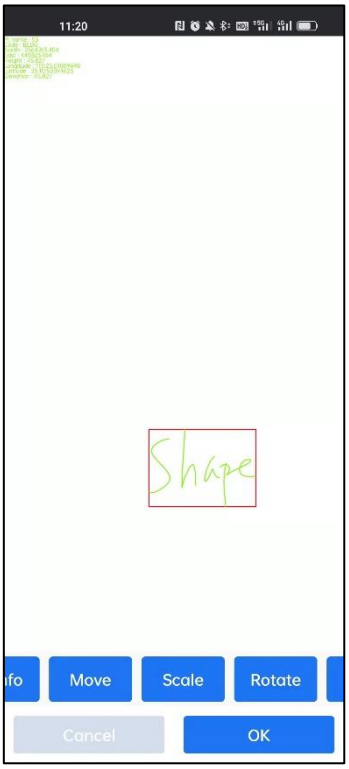




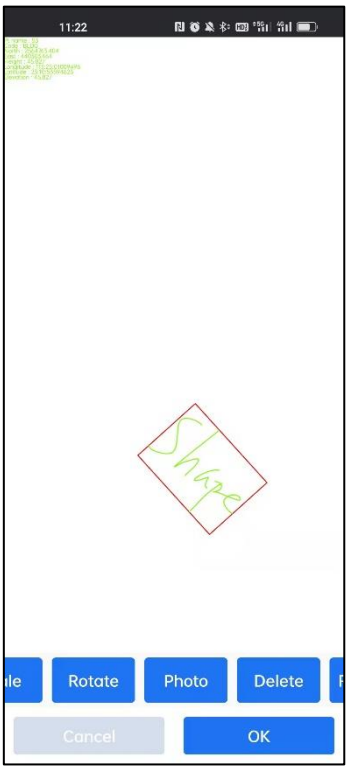
Click Move and select any drawn shape, we can move it.



Click Scale and select any drawn shape or photo, we can scale it.



Click Rotate and select any drawn shape or photo, we can rotate it.



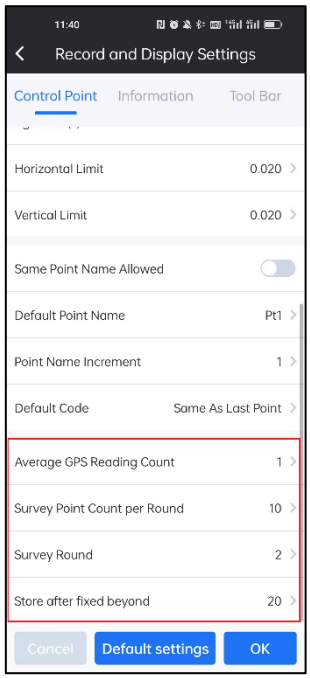
Click Photo and select any drawn shape or photo, we can directly invoke system camera to take a picture.

Click Delete and select any drawn shape or photo, we can delete it.

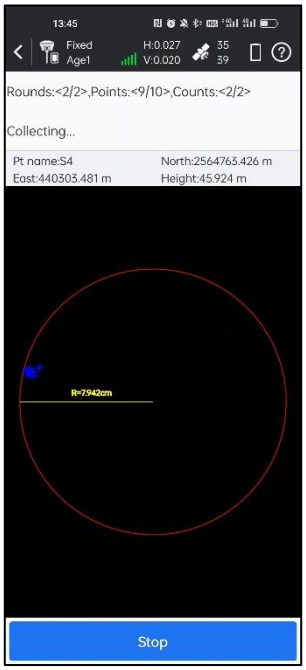
Click RollBack, it will roll the previous operation back.

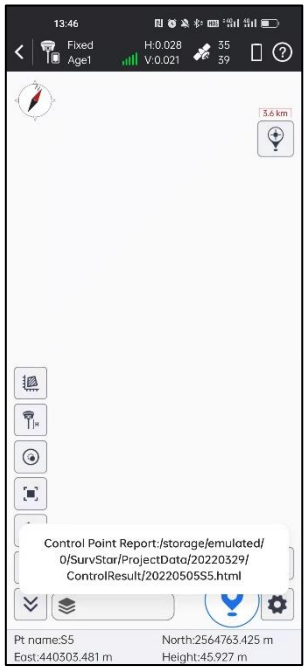
Control point: 

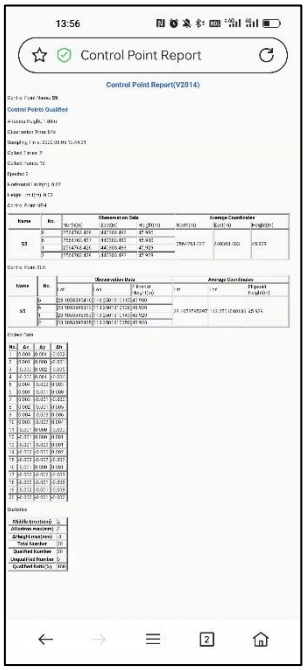
We can set the control point surveyed parameters in Record and Display Settings.



Click  and wait for 20s delay for fixed solution, then it starts to collect data. It records one point every 1s, continuously records 10 points and collects 2 sets of 10 points (the above data is taken for example according to the control points record settings). When collection is finished, it will output a Control Point Report automatically.





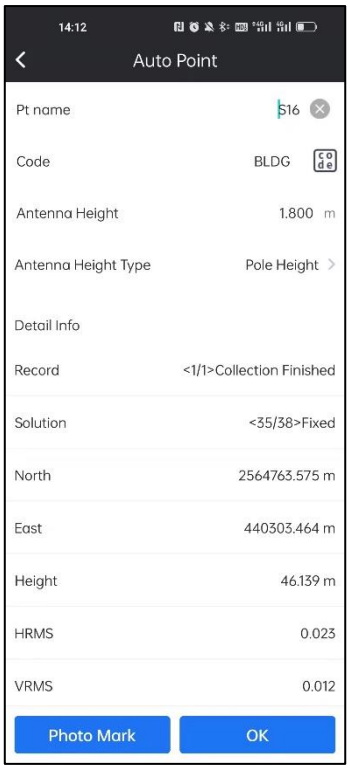


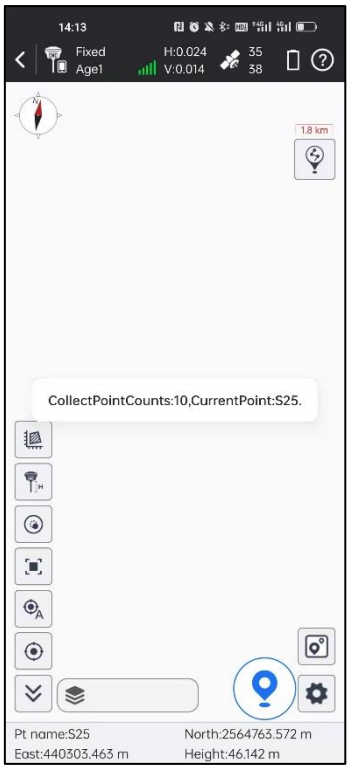
Quick point: 

When you collect quick point, if the measured point meets record limit, then it will finish collection after prompt voice, and there will not show storage page.

Auto point: 

Click  and set record parameters, click OK to start collection. Click  again to end the auto points recording.

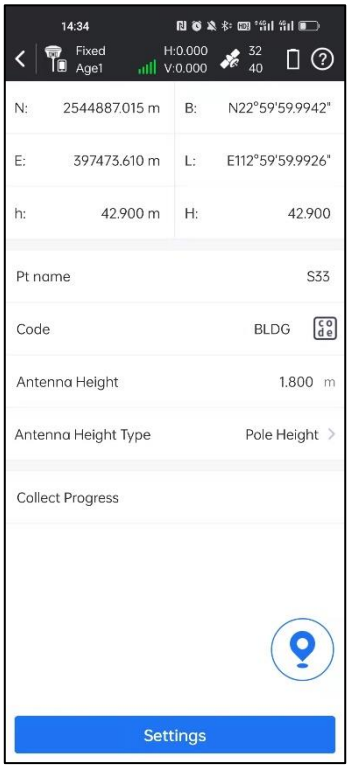


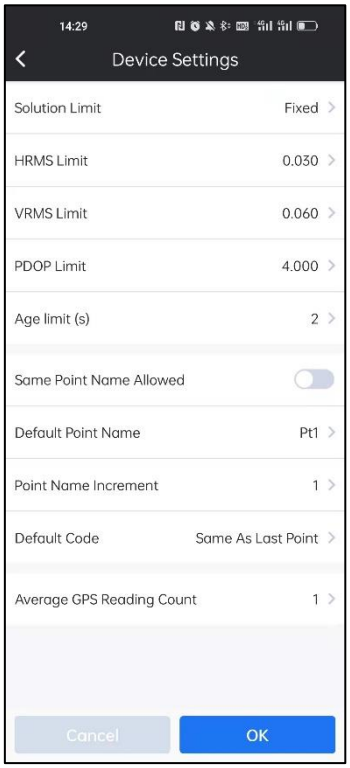


5-2 Detail Survey

By clicking this, it will enter to detail survey page. Its upper toolbar information is same as that of Point Survey. Detail Point is a simplified point survey mode, which is suitable for rapid and continuous coordinate survey.

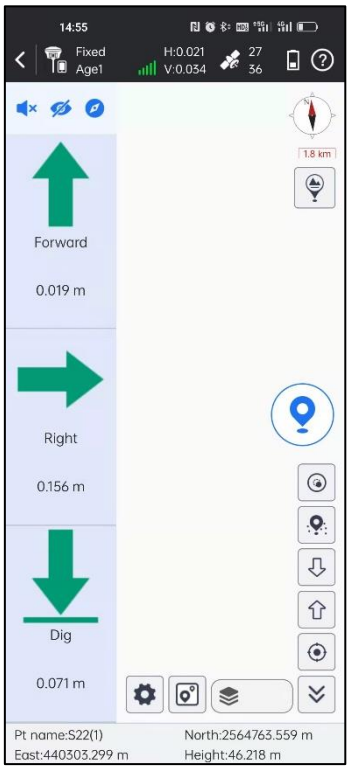
Click Settings and set recording limit and click OK to return to detail survey page. to Set Pt name, Code, Antenna Height and Antenna Height Type, click  to complete point collection.





5-3 Point Stakeout

Point stakeout is the process of inputting target coordinate in software and stakeout in field. By clicking this, we will enter to points database. Select any point, and click OK. Then we will enter to the point stakeout page.



Arrows in left bar describe as follows:

To Forward/Backward: distance that receiver needs to move Forward/Backward from current position to stakeout point. To Forward arrow shows up and to Backward arrow shows down.

To Left/Right: distance that receiver needs to move Left / Right from current position to stakeout point. To Left arrow shows left and to Right arrow shows right.

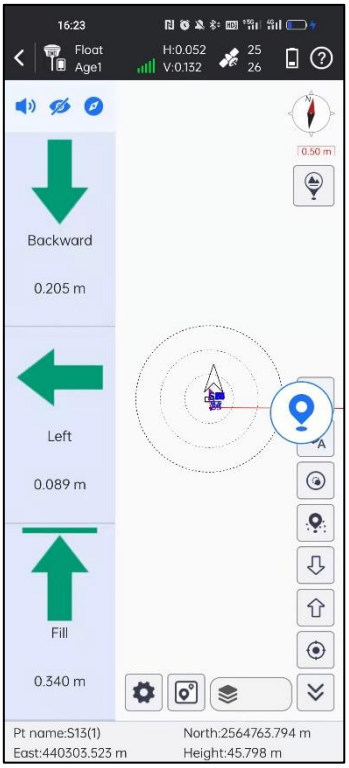
Fill/Dig: dig in stakeout point position. If the value is positive, perform excavation; if not, perform fill. If current height is higher than stakeout point arrow shows down. If current height is higher than stakeout point arrow shows up.

: open/close stakeout voice prompt.

: hide or show left arrow bar.

 : switch compass mode or distance mode.

This is the distance mode.



There are two states for compass mode.

State 1: Red flag represents target point, blue arrow represents moving direction from current receiver position to stakeout point, green arrow represents the direction from the collector pass and words below represents distance to target point.

State 2: In gray/green circle the red flag represents stakeout target, and blue circle represents receiver position. When stakeout distance doubles Prompt Range, it would change state 1 into state 2; when stakeout distance meets Prompt Distance, state 2 blue circle would turn into green.

The icons in side toolbar describe as follows:

 : Points database.

 : Tilt Survey

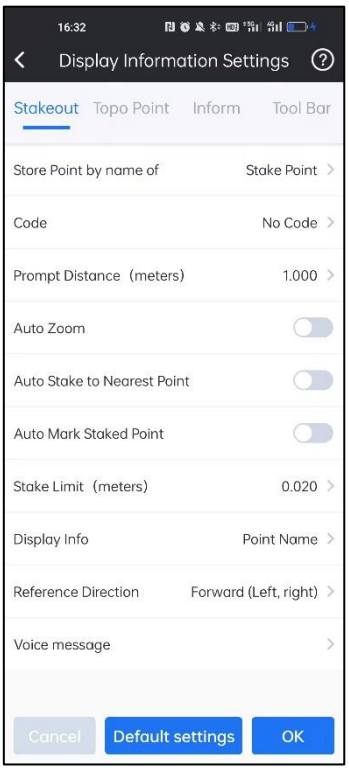
 : Nearest Point.

 : Next Point.

 : Last Point.

: Point stakeout settings.

It can set stakeout settings, including Prompt Distance, Stake Limit, Display Information (Not Display, Point Name, Code), and Reference Direction (Forward, North); settings for Topo Point, Inform and Tool Bar are the same as that of Point Survey. Click Default settings and it can restore the changed settings.



Prompt Distance: taking stakeout point as center of a circle and drawing three concentric circles with radii are multiples of 1, 2 and 3 times of the prompt range, area covered by these three concentric circles is prompt range.

Point stakeout steps:

1. Select a point to stakeout in the points database, then click OK to enter points stakeout page. Red flag is target stake point. Circle is current position of receiver. Arrow is direction indicator, indicating the direction of current receiver. When the arrow direction is same with the direction to the target point, please move in this direction, then you can reach the target point.

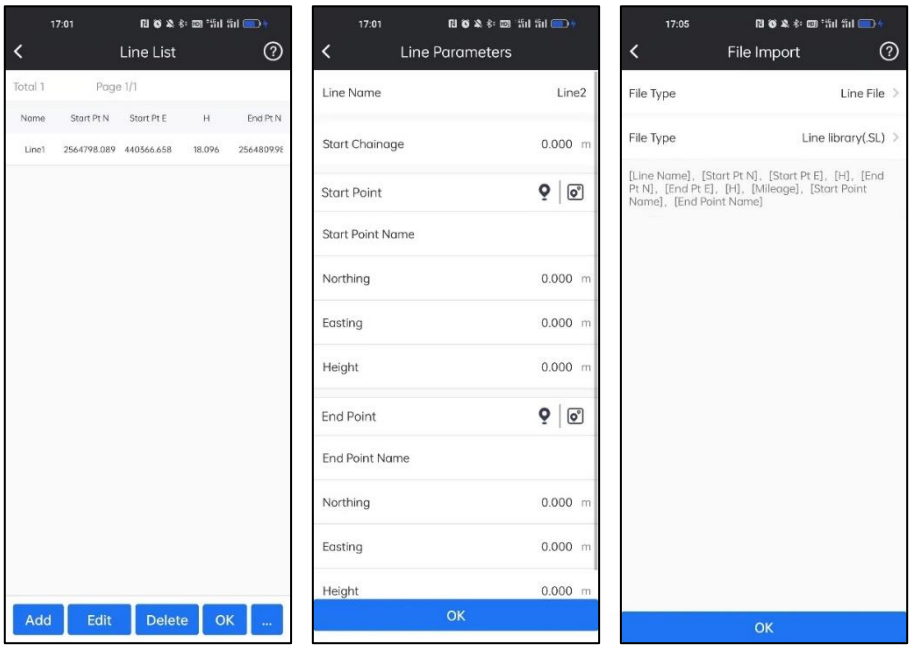
2. According to left status bar, move from the current point to the stakeout point, and excavate or fill the soil according to the height difference of the elevation.

3. When current point is within prompt range, there will be three concentric circles, which indicate it enters precise stakeout.

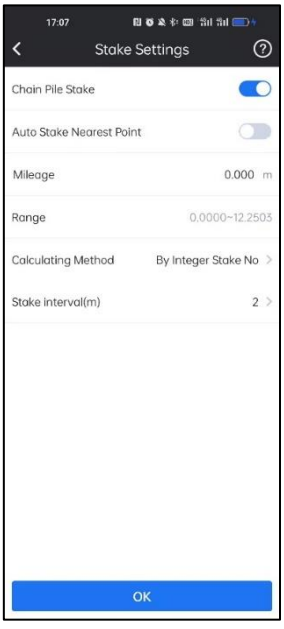
4. After you reach the stakeout point, please stake it.

5-4 Line Stakeout

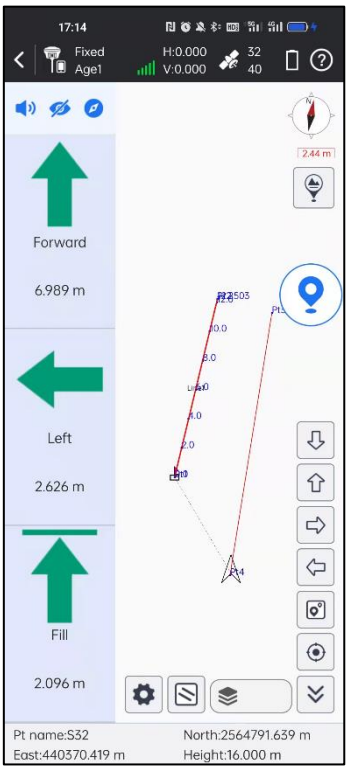
Line stakeout is the stakeout of designed line, including line mileage, left and right offset and elevation control within line. By clicking this, we will enter to Line List. Click Add, we can add the designed line with Line Name, the Start Point, End Point and Start Chainage. We can also import line file(*.SL).



Select any line, and click OK. We can set the settings of stake, it including Chain Pile Stake On/Off, Auto Stake Nearest Point On/Off, Mileage, Range, Calculating Method and Stake interval. Click OK.



Then we will enter to the line stakeout page.



The icons in side toolbar describe as follows:

 : Line List.

 : Next Point.

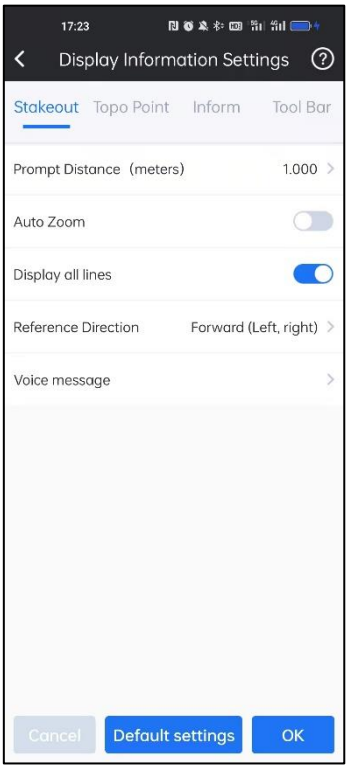
 : Last Point.

 : Next Line.

 : Last Line.

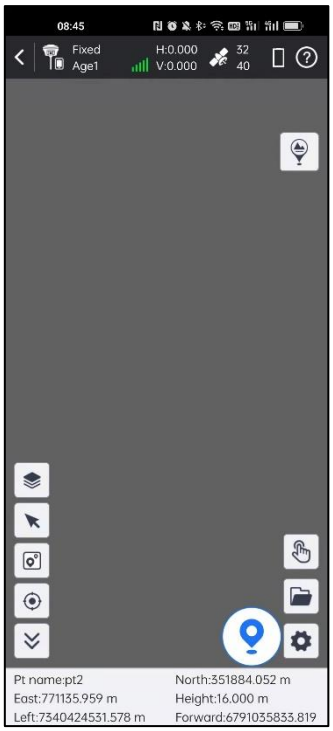
: Line Stakeout Settings.

It can set line stakeout settings, including Prompt Distance, Reference Direction (Forward, North); settings for Topo Point, Inform and Tool Bar are the same as that of Point Survey. Click Default settings and it can restore the changed settings.



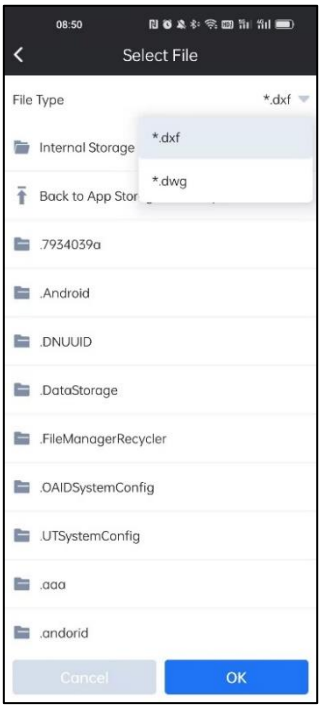
5-5 CAD

CAD is mainly used to stakeout lines in the existing CAD graphics. By clicking this, we can enter to the CAD page.



The icons in side toolbar describe as follows:

 : Import CAD file(*.dxf/*.dwg).



 **: CAD Layer.**

We can manage and check the CAD layer by clicking this icon.

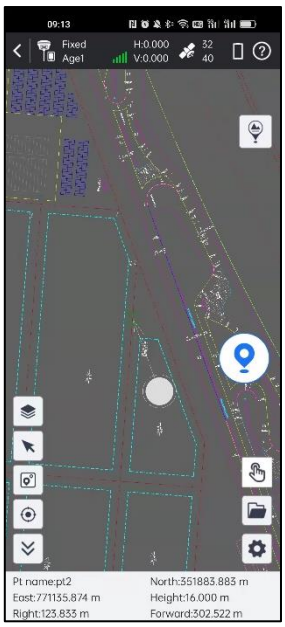
 : Layer switches, controlling layer display.

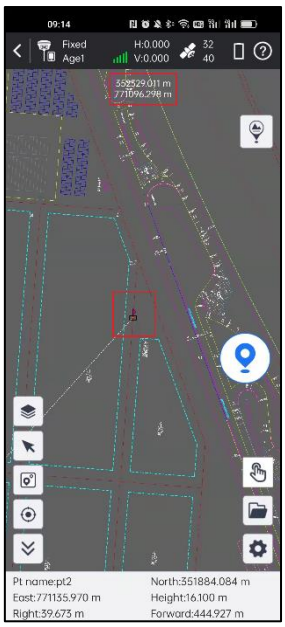
 : Layer freeze, cannot edit or modify after freezing.

 : Layer locking, cannot select after locking.

 : Select Mode.

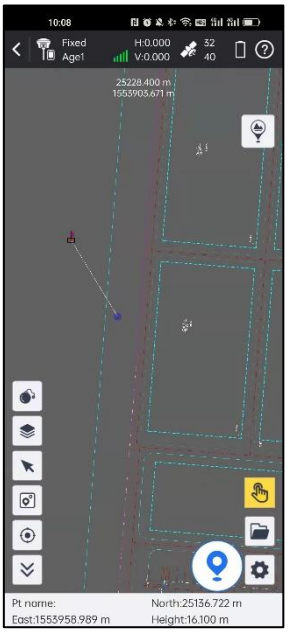
By clicking this, there will be an arrow when touch and hold to move on the screen. The place indicated by the arrow is the place of the target point. It can also show the coordinates of this point in the top of the page.





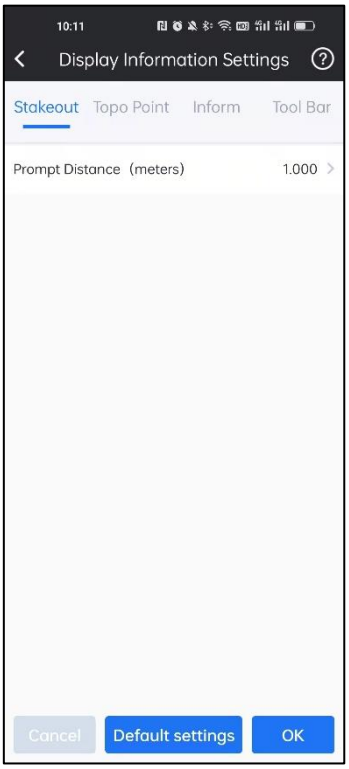
 : Select CAD.

By clicking this, we can select a surface feature in project. And it will be a target surface feature. The point closest to the selected feature is used as the target point.



 : CAD stakeout settings.

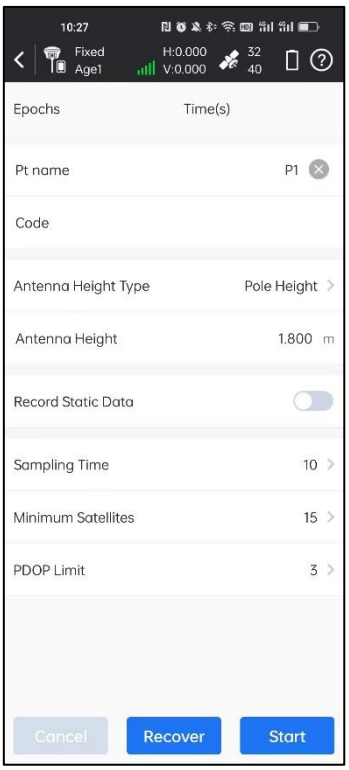
It can set CAD stakeout settings, Prompt Distance; settings for Topo Point, Inform and Tool Bar are the same as that of Point Survey. Click Default settings and it can restore the changed settings.



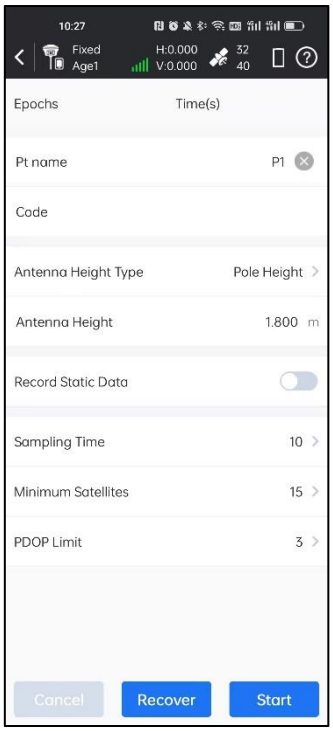
5-6 PPK Survey

PPK (Post Processed Kinematic) is a post-processing differential technology to obtain centimeter level positioning accuracy information. Compared with RTK (Real Time Kinematic) positioning, PPK can record the data of mobile terminal and base station respectively for post-processing kinematic, so it is not limited to the communication link and protocol between base station and mobile station. It is also called Stop & Go.

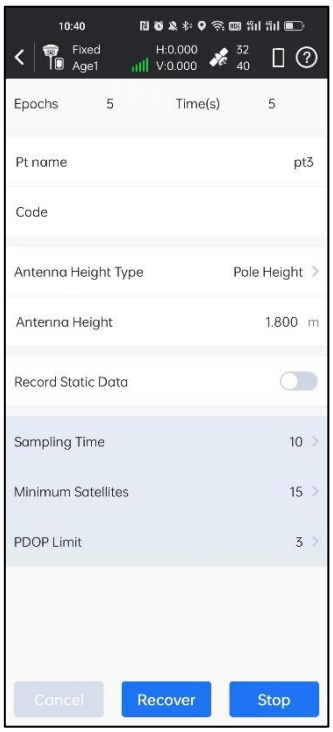
1.We need to set a base station as static mode firstly. And then we start it with another device as rover mode.



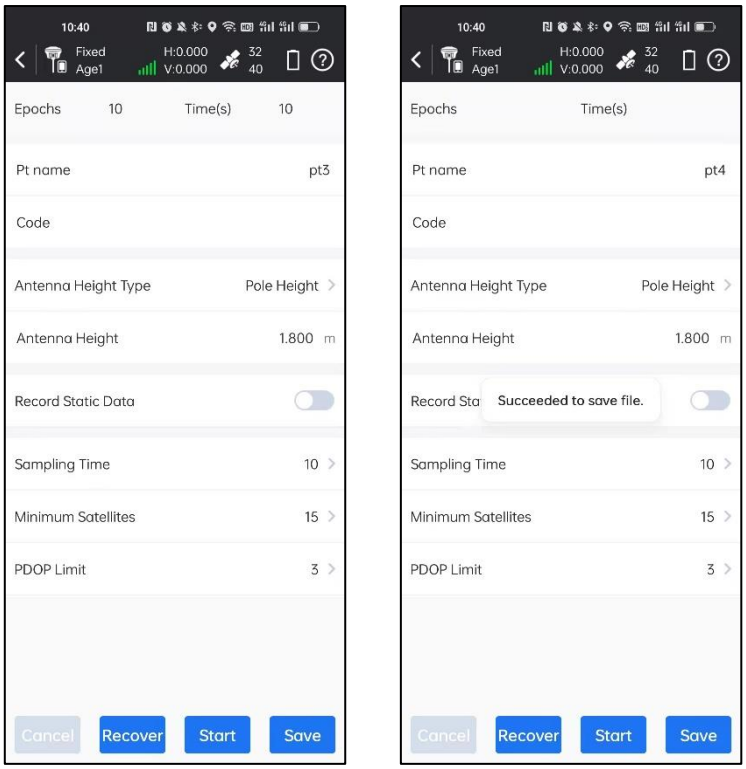
2.Set the Pt name, Code, Antenna Height Type, Antenna Height, Record Static Data On/Off, Sampling Time, Minimum Satellites and PDOP Limit. Before starting work, we need to take about 30 seconds standing to initialize the device, for the higher accuracy.



3. Put the device in the first point and click Start. It will collect this point and write the information of this point into the record file. We can click Stop to stop it.



4. After collecting the point, we can click Save to save the point and then go to the next point.

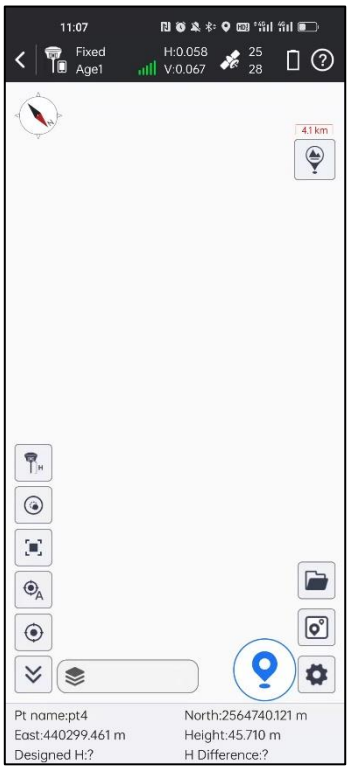


5. Repeat these steps until the project done.

5-7 Elevation Control

Elevation control can calculate the design height of points within the range according to the design plane parameters, which is conducive to site leveling and earthwork calculation in the project.

1.Click  to open Surface manage page.

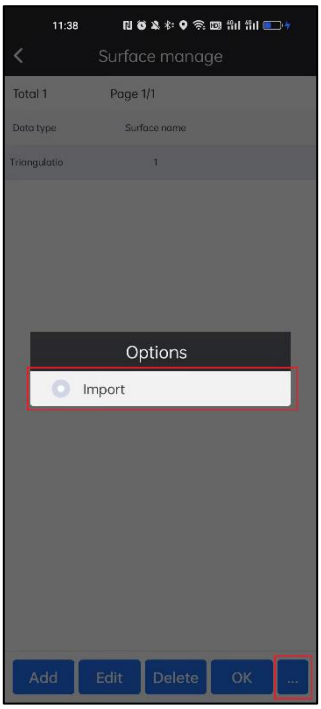


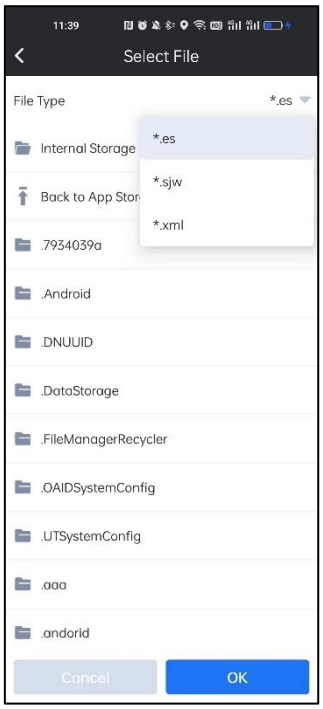
2.Add/Import Surface.

There are two ways to add/import surface.

Import:

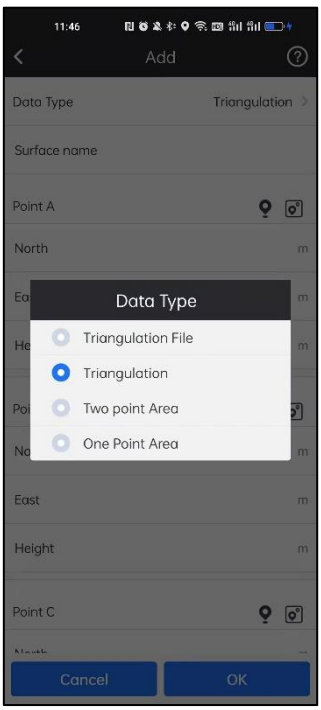
Click […] and click [Import], select the surface file (*.es/*.sjw/*.xml) and click [OK].

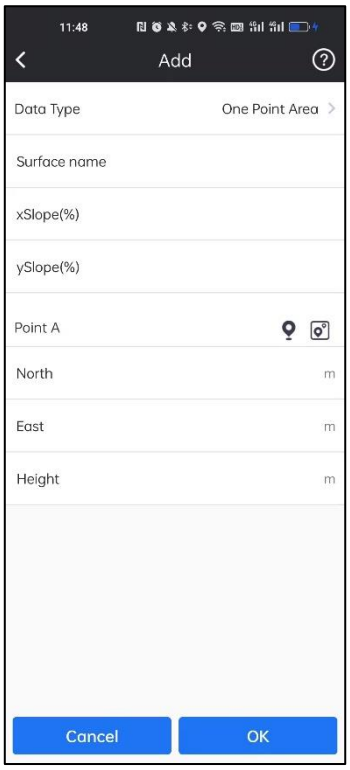




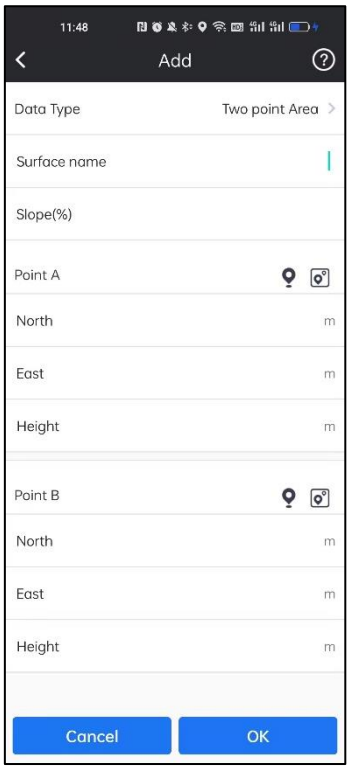
Add:

Click [Add], select the Data Type to build elevation plane. We can use three ways to build it: one point with two slope, two points with one slope and Triangulation.

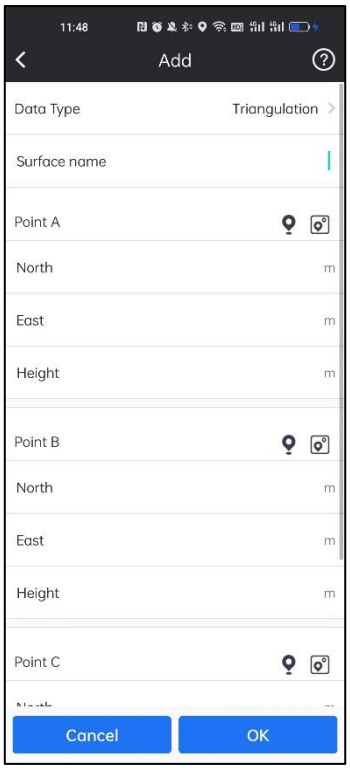


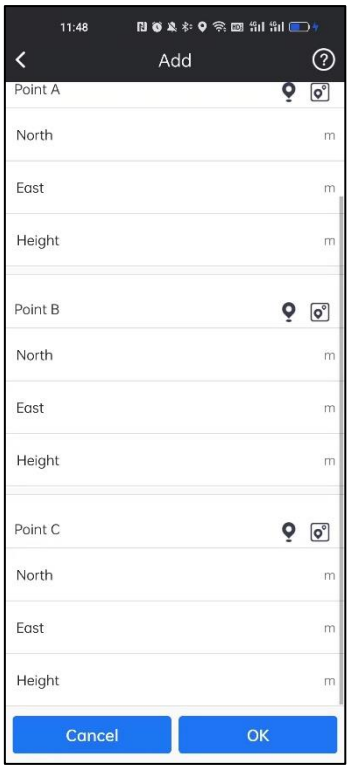


One point

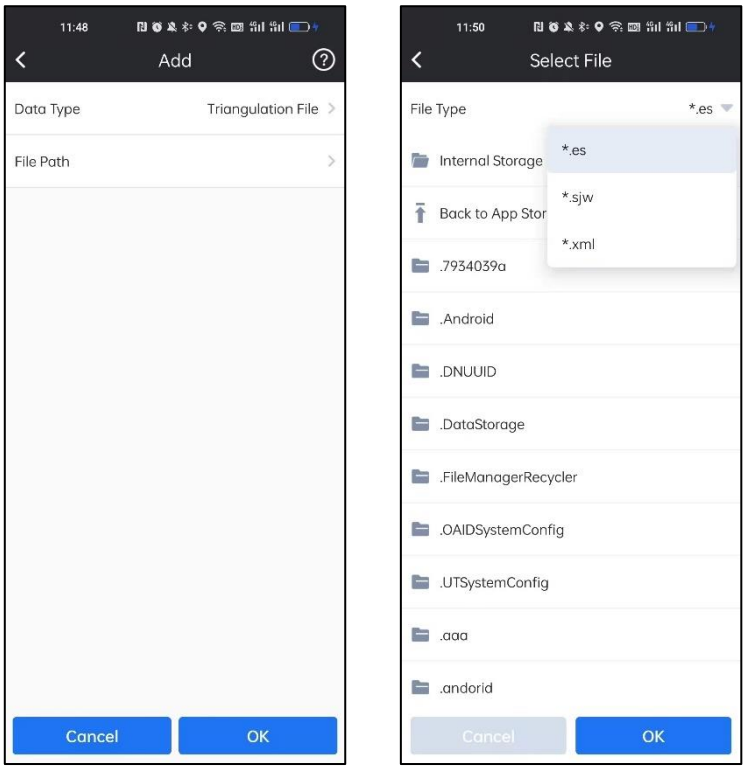


Two points



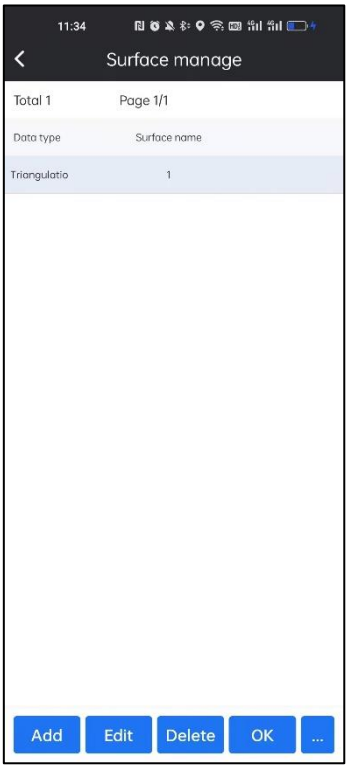


Three points

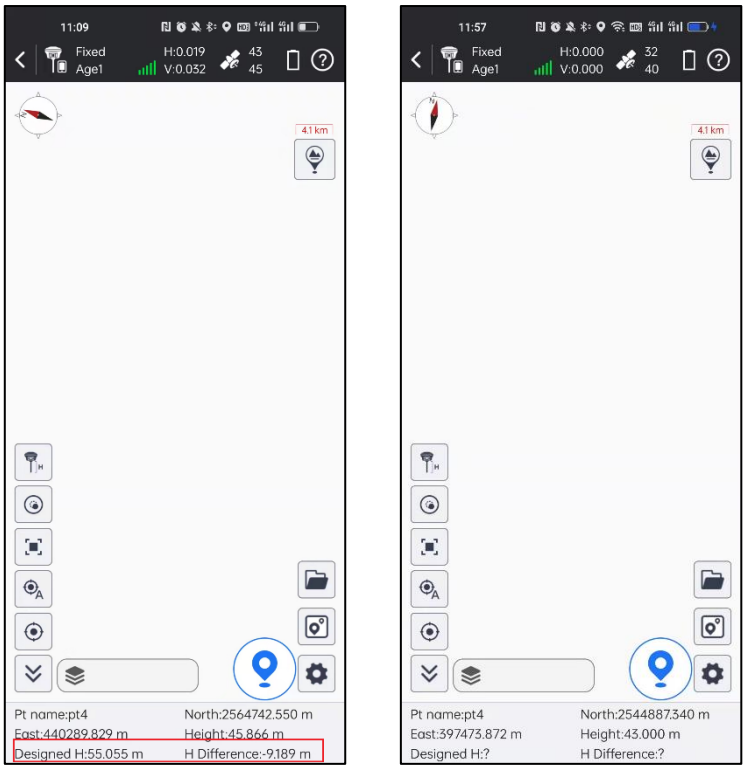


Triangulation file

3.Then we can select the surface and click OK to do the elevation control.



4.If the device is in the surface, there will be designed height and H difference shown in the below bar. If it is outside, there will be '?'.

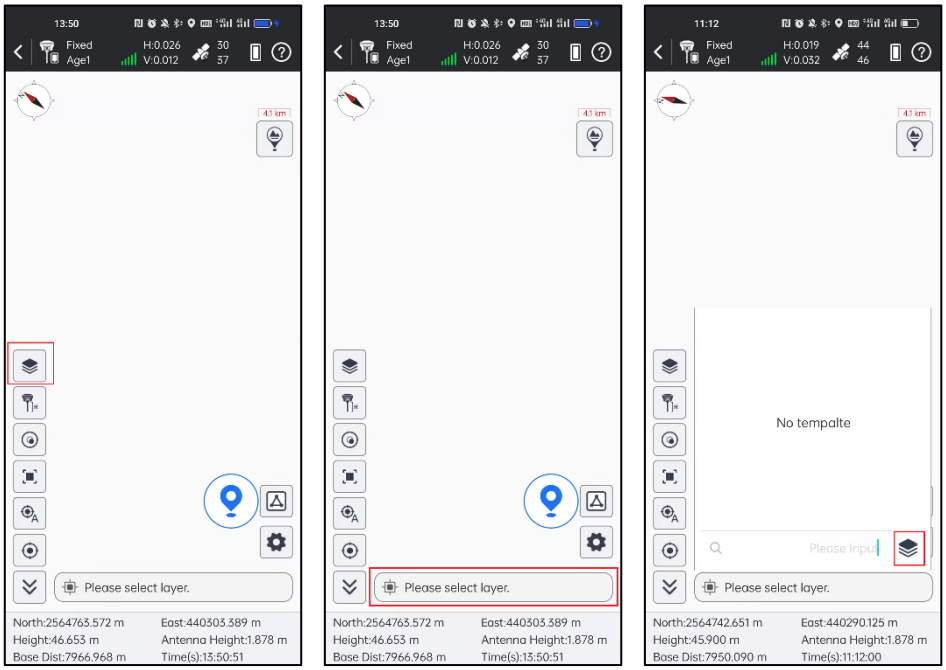


We can control the elevation with the designed surface. And know the any point H difference in the range of the surface.

5-8 GIS Survey

GIS survey can define the required feature attribute database and collect shape data containing various required feature attributes, which is convenient for post-processing of GIS data in the later stage.

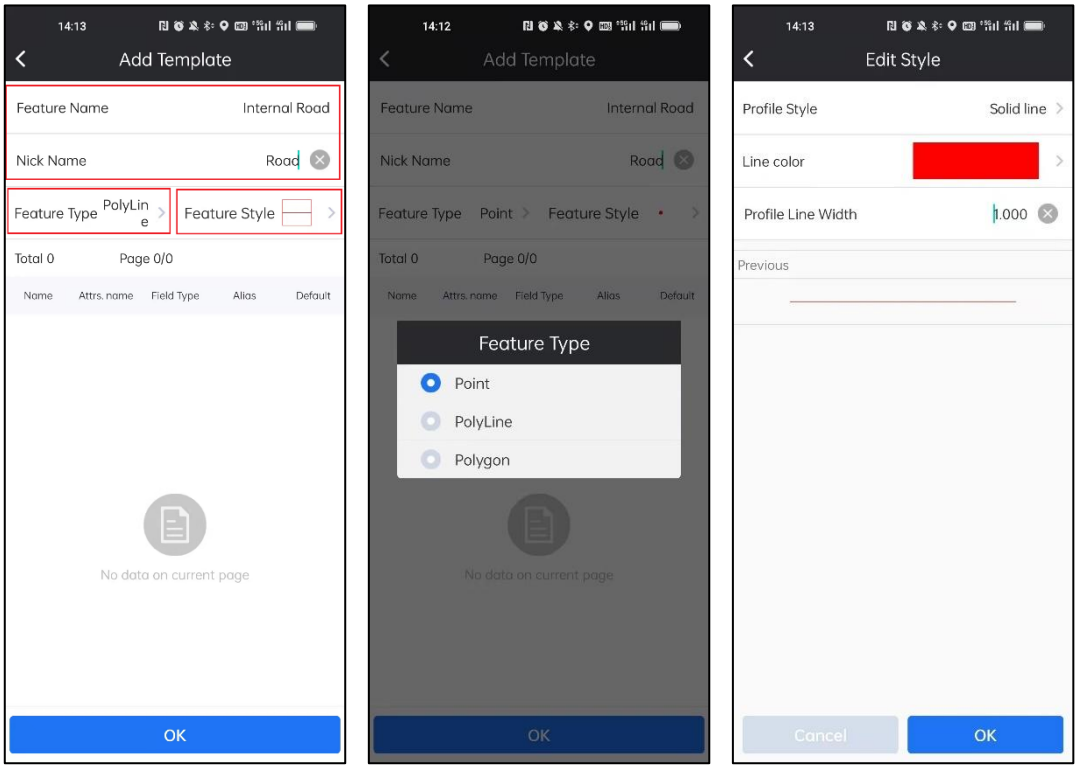
1.For the new project, we need to import or input a feature manage database. Click  and enter to feature manager page. We can also click the layer bar to enter to it.



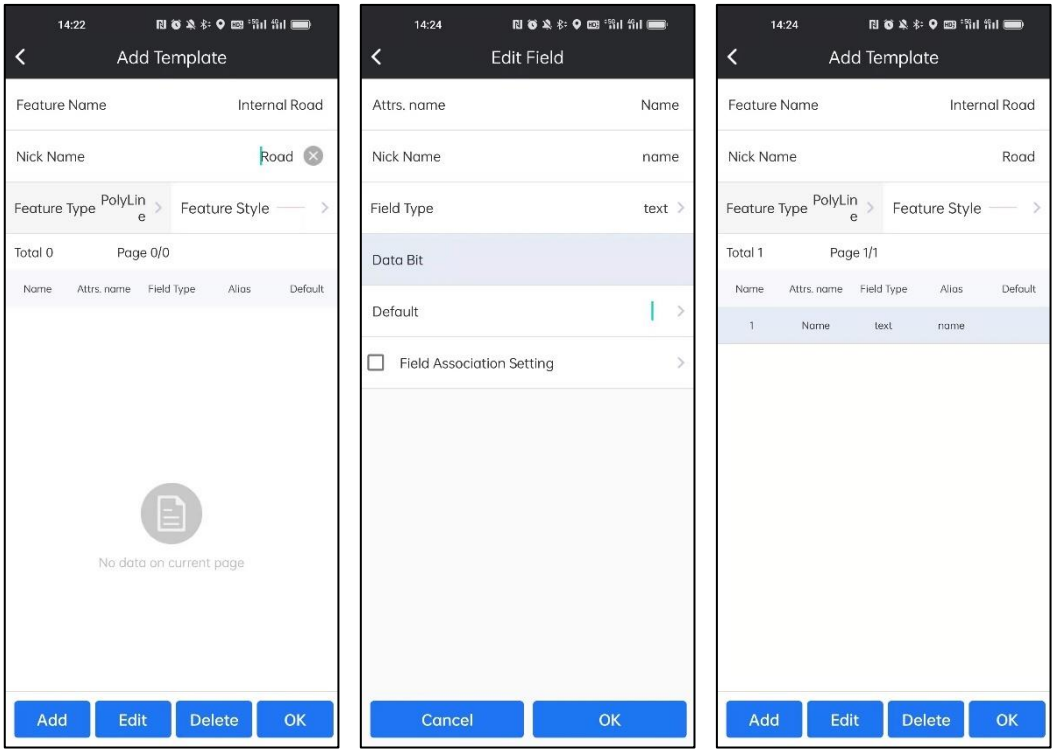
2.In feature manager, we can add, edit, delete, import and export the features.

Add:

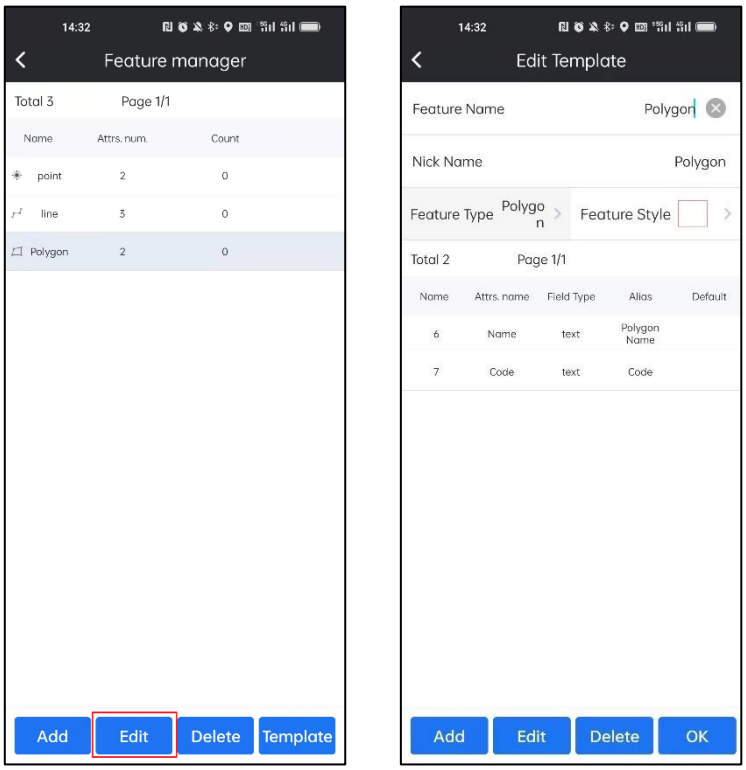
Click Add, input the feature name and nick name, choose the feature type (Point/PolyLine/Polygon) and set the feature style, then click OK.



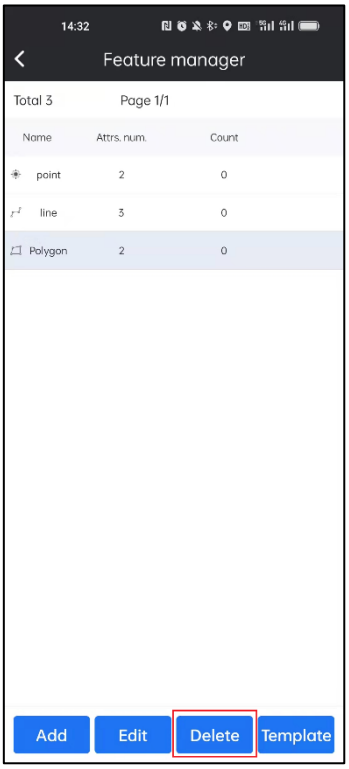
Then we need to add the attribute of it, click Add. Input the Attributes Name, Nick name, Field Type and click OK. If the input of the attributes finished, click OK.



Edit: Select any feature, click Edit, then we can edit it.

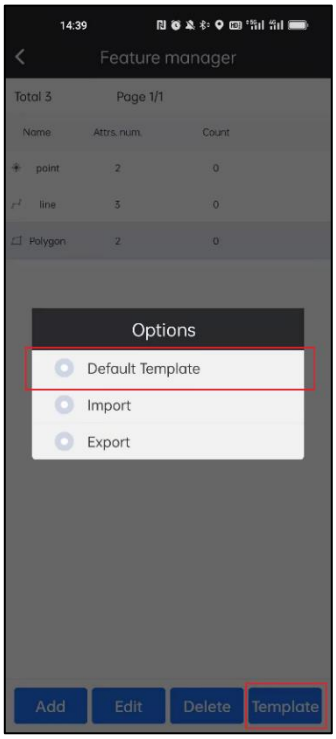


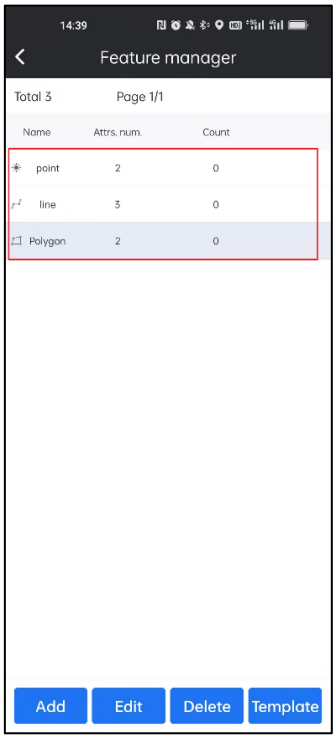
Delete: Select any feature, click Delete, then we can delete it.



Default Template:

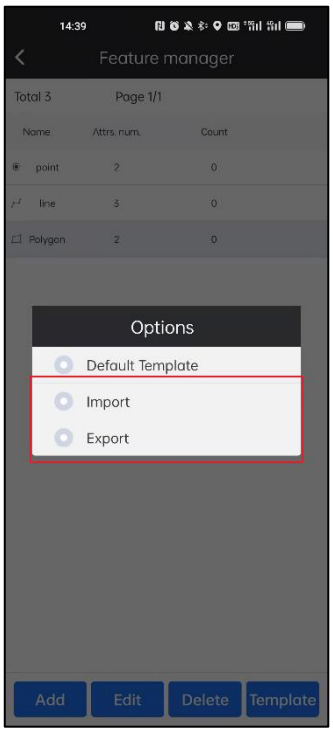
Click Template and click Default Template, there will load the default template to it. It has three features: Point, Line and Polygon.

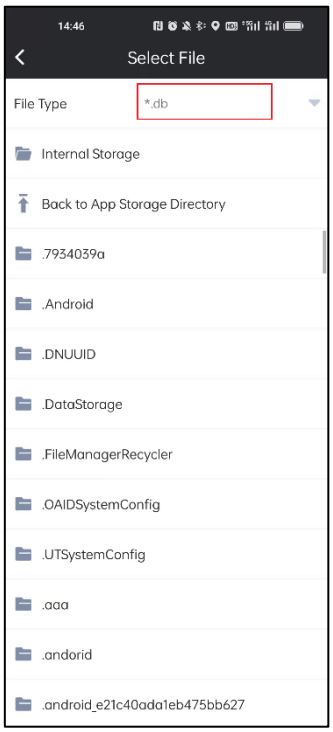


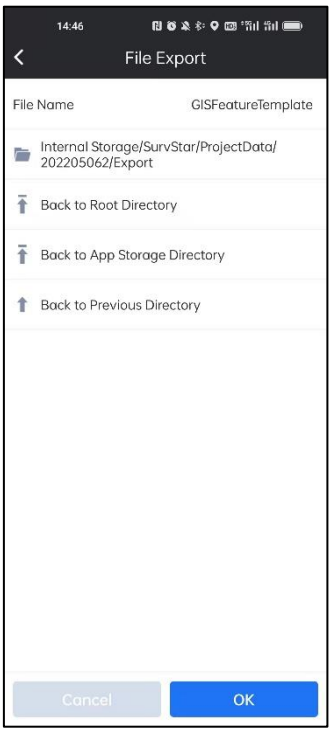


Import/Export Template:

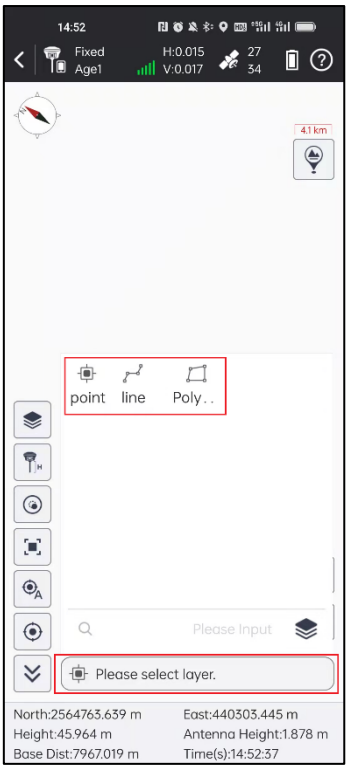
Click Template and click Import/Export, select the template file(*.db)/select the export path and click OK. The template file will be imported or exported.



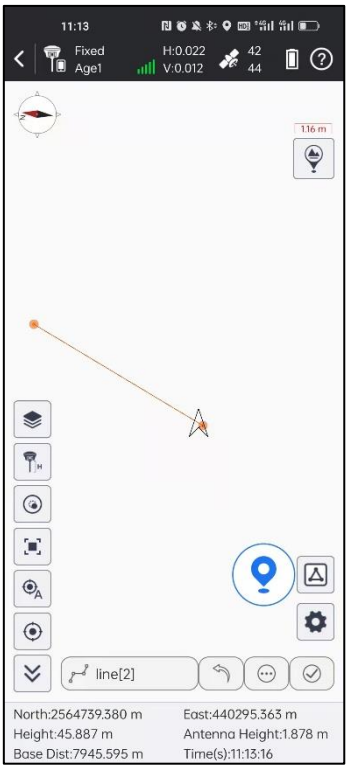




3.After the feature manager completed, we can use it by clicking the below layer bar. Select the feature and then we can start GIS survey.



4.For example, select a line feature template. And start to do GIS survey.

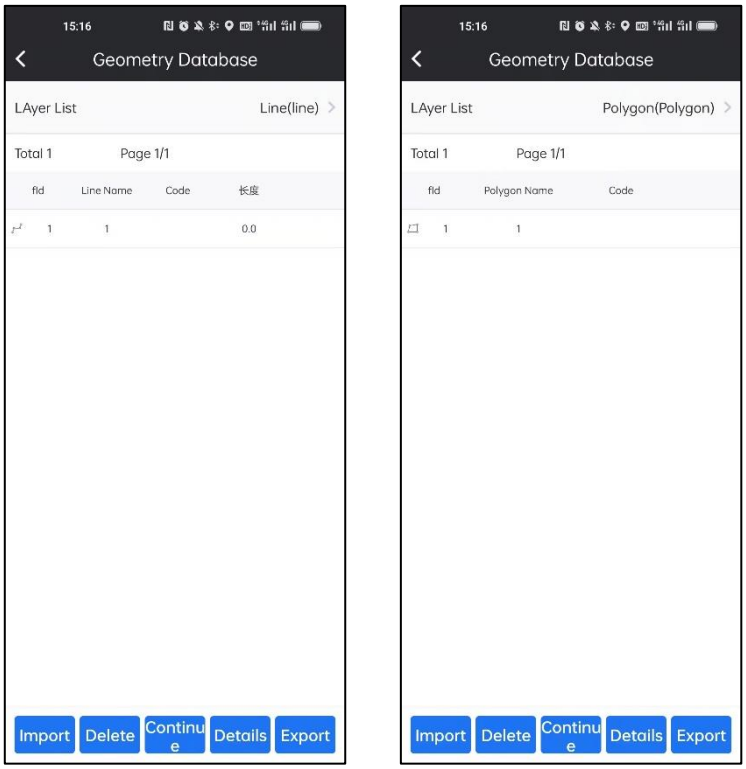


: Click this, it will go back to the previous operation

: Click this, we can edit the attributes of current feature.

: Click this, we can finish surveying this feature.

5.We can check and manage the shape in Geometry Database. Click and enter to Geometry Database. In Geometry Database, it can import/export shape file(*.shp), delete and continue to survey the feature.



5-9 Sea Survey

This function is being improved and tested.

5-10 Line Construction Stakeout

This function is being improved and tested.

5-11 Line Pointwise Stakeout

This function is being improved and tested.

5-12 Cross-section Survey

This function is being improved and tested.

5-13 Cross-section Stakeout

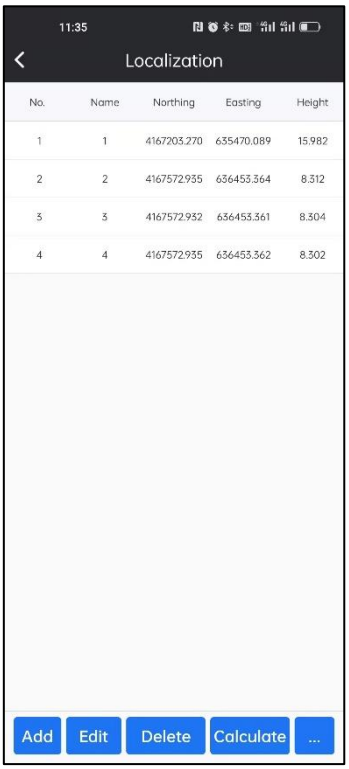
This function is being improved and tested.

Chapter 6 Tools

6-1 Localization

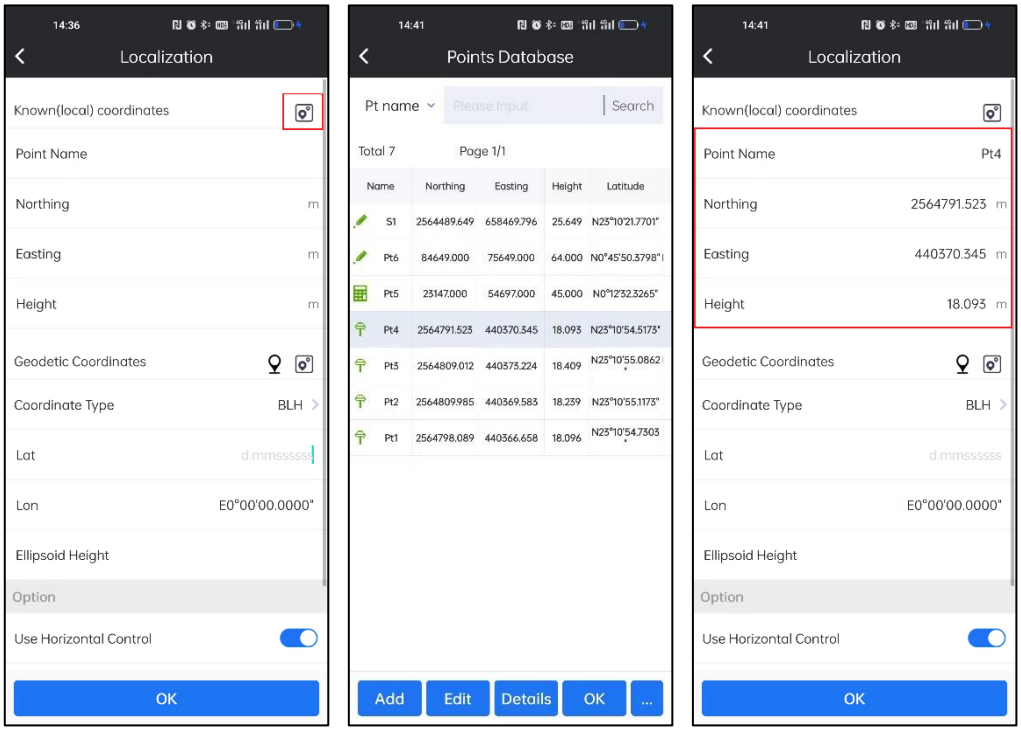
In general, GPS receiver output data is WGS-84 latitude and longitude coordinates. The coordinates need to be converted to the construction measure coordinates, which requires software to calculate and configure coordinate conversion parameters. Localization is the main tool to complete this conversion.

It contains Add, Edit, Delete, Calculate, Import, Export and Settings operation.

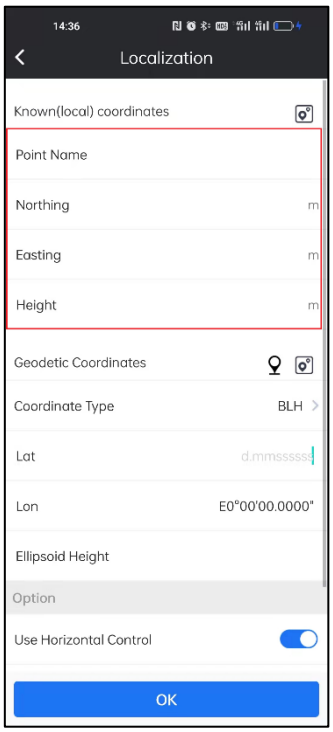


Add:

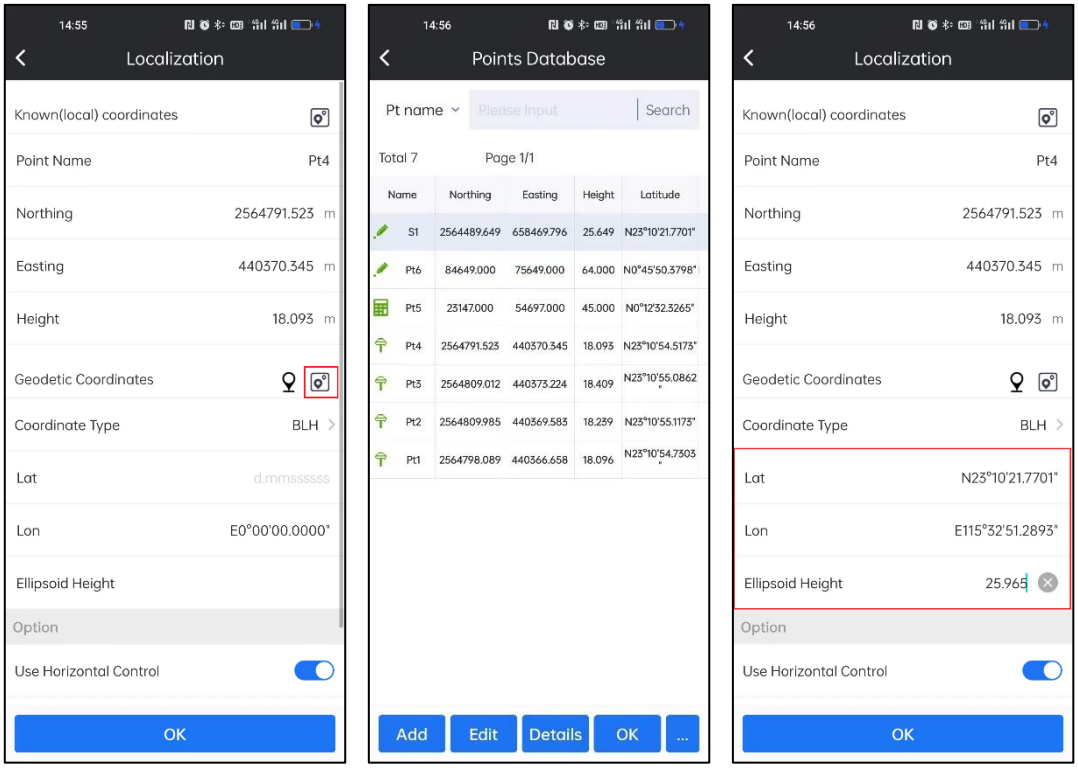
Click Add, we can add the coordinate point. If we have the surveyed point in database, we can click the icon in the right of the Known(local) coordinates bar. And select the coordinate transformation points with the targeted coordinate. Click OK. Then the NEH will input automatically.



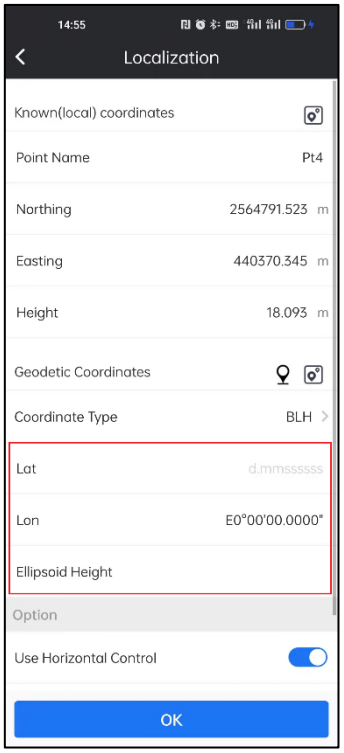
Or we can input the coordinate directly.



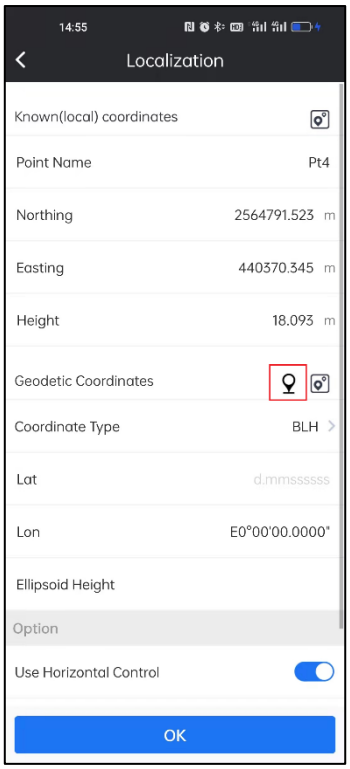
And then we need to input the same point's BLH to it. If we If we have the surveyed BLH in point database, we can click the icon in the right of the Geodetic Coordinates bar. And select the same points with the BLH. Click OK. Then the BLH will input automatically.



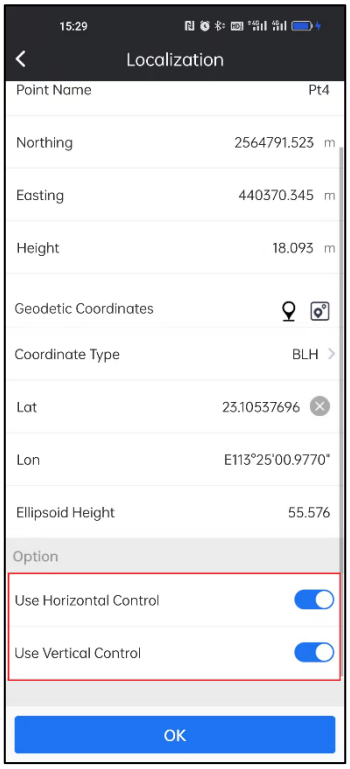
We can also input BLH directly.

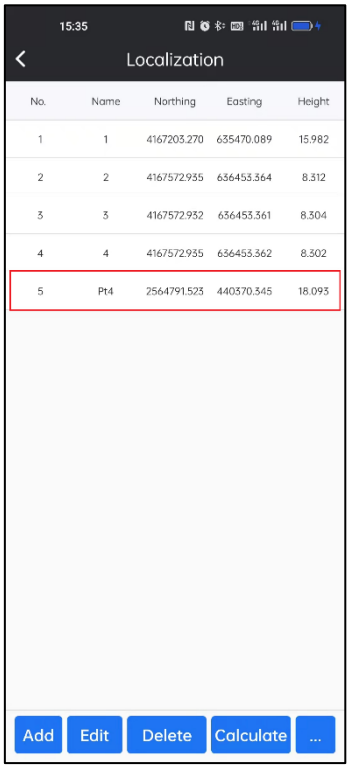


We can also put the device in the point and collect the BLH in site. Click the icon in the right of the Geodetic Coordinates bar. And click OK to collect it.



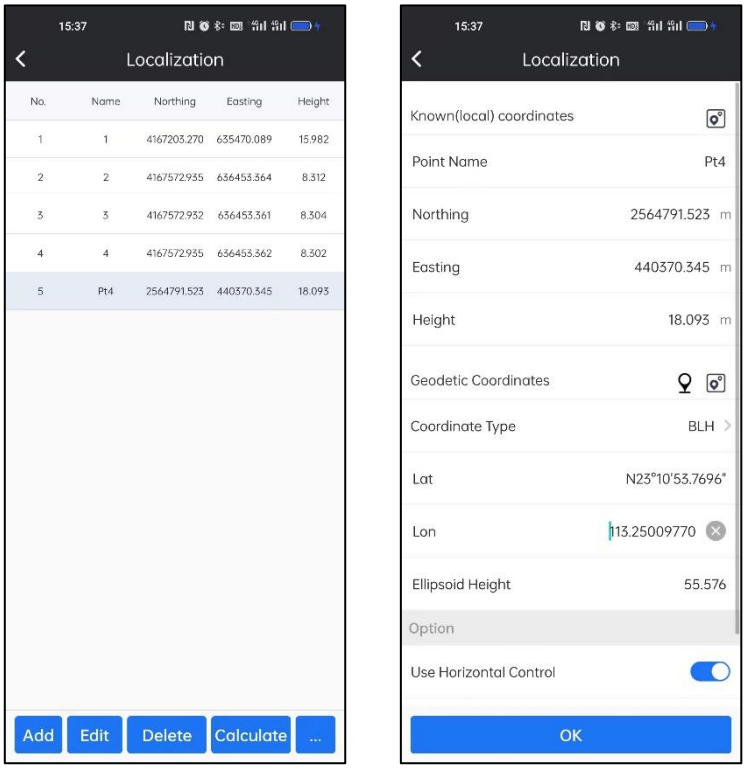
Then we need to select whether to use the point with horizontal control or vertical control. And Click OK. This point will participate in calculation.





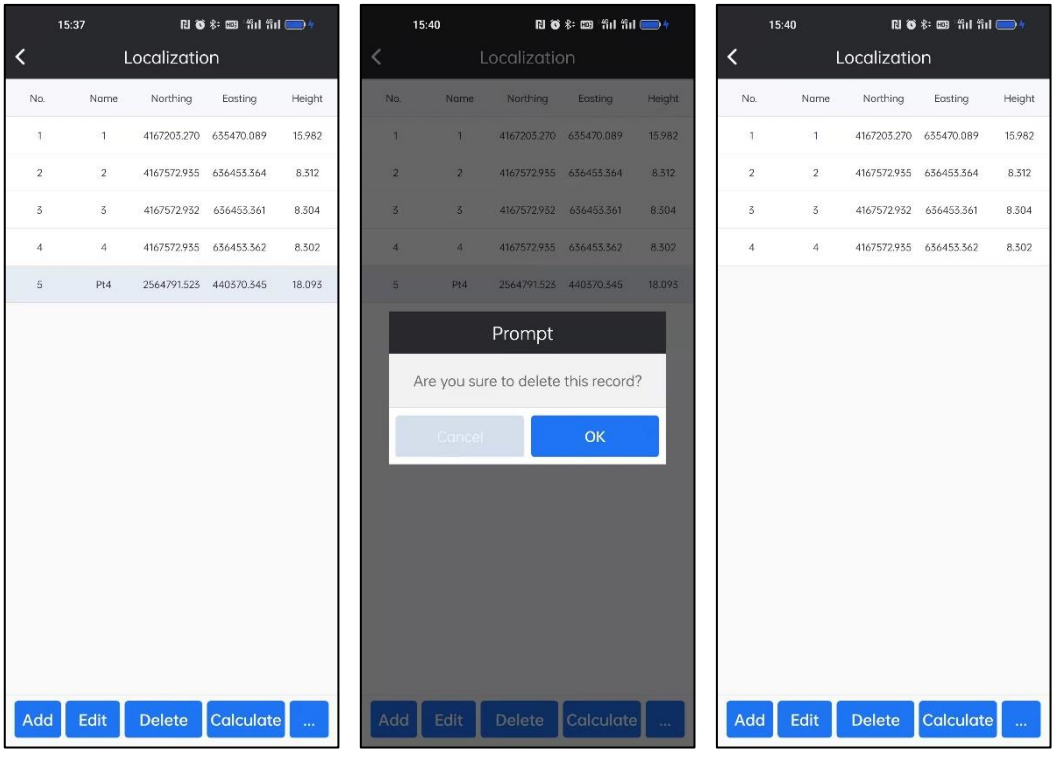
Edit:

Select any point and click Edit. We can edit the coordinate of the selected point and select whether to use the point with horizontal control or vertical control.



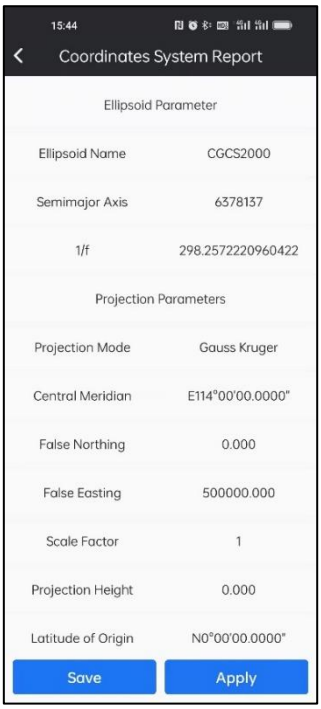
Delete:

Select any point and click Delete. We can delete the selected point.



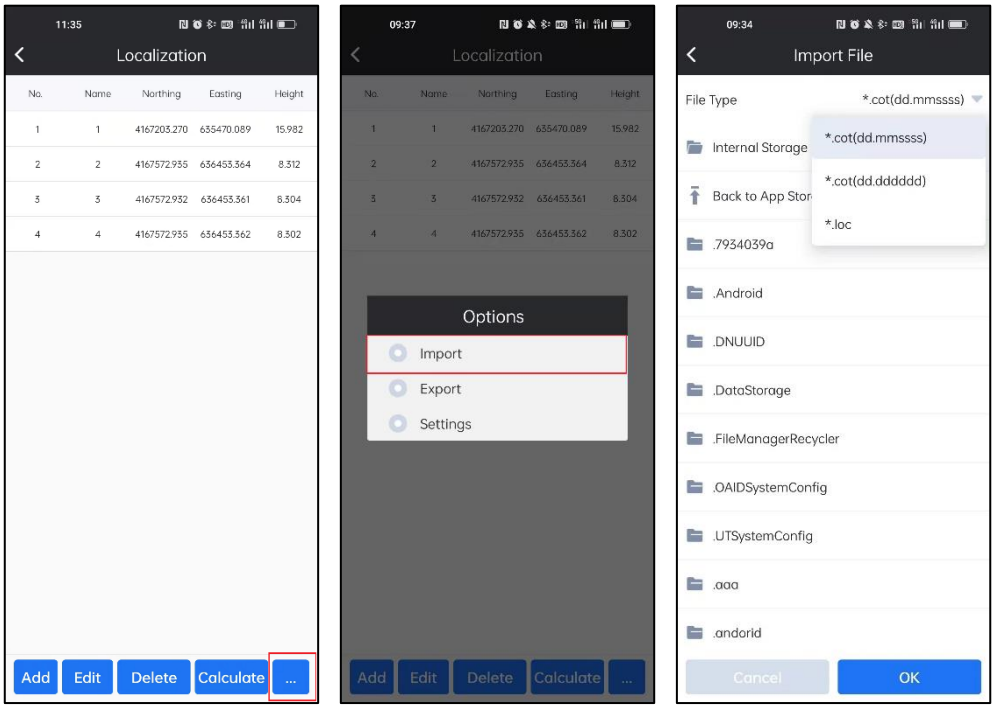
Calculate:

After the coordinate transformation points all inputted. We can click Calculate. Then there will show a coordinates System report. We can save the report by clicking Save. And click Apply, the parameters will apply to the current project.



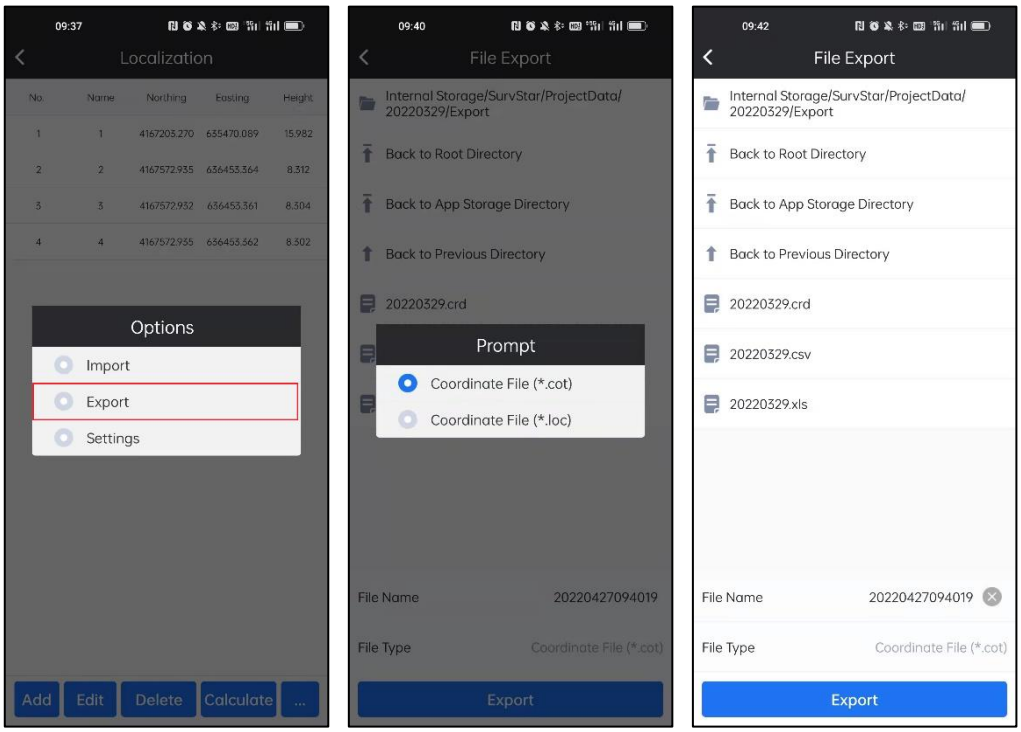
Import:

Click … and Click Import. Select the file type: *.cot(dd.mmssss), *.cot(dd.dddddd) and *.loc. Select file path and click the file. Click OK.



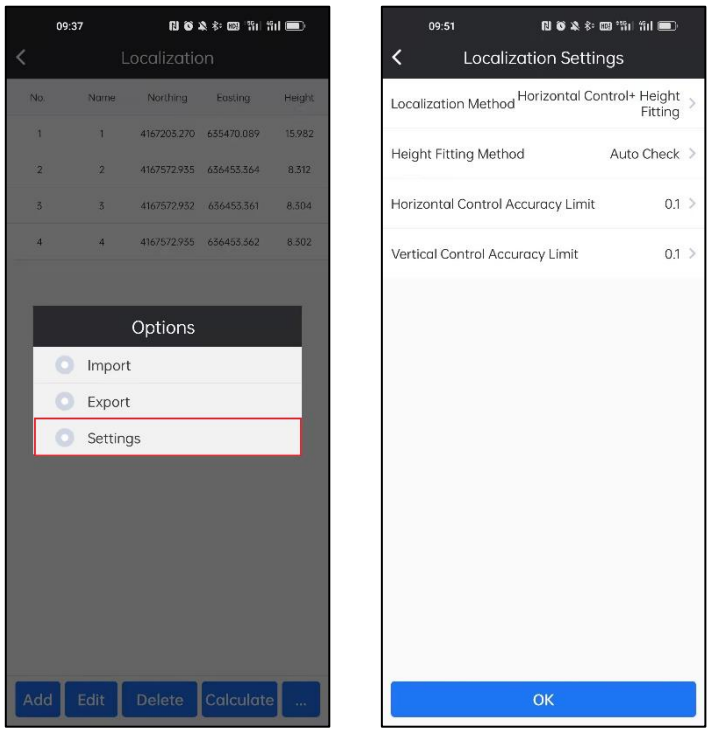
Export:

Click … and Click Export. Select the file type: *.cot(dd.mmssss) or *.loc. Select file path and click the file. Click Export.



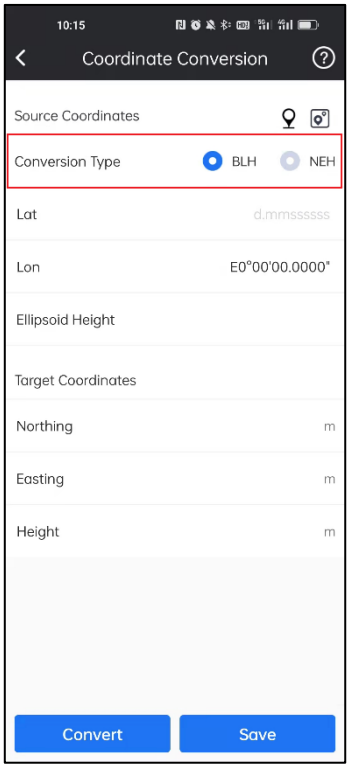
Settings:

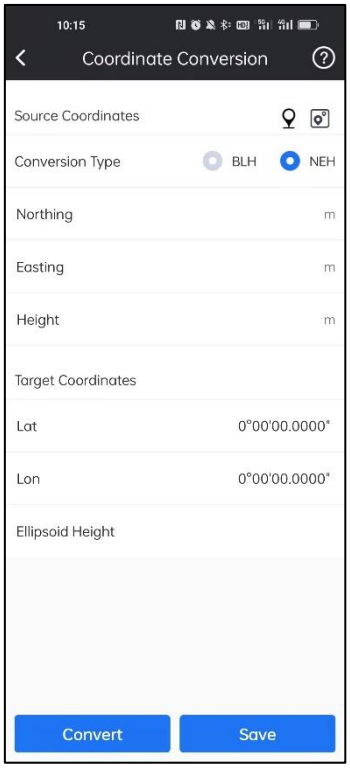
Click … and Click Settings. We can set localization method, height fitting method, horizontal control accuracy limit and vertical control accuracy limit.



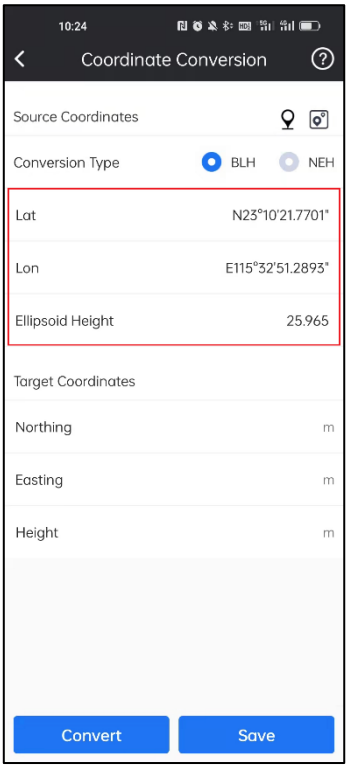
6-2 Coordinate Converter

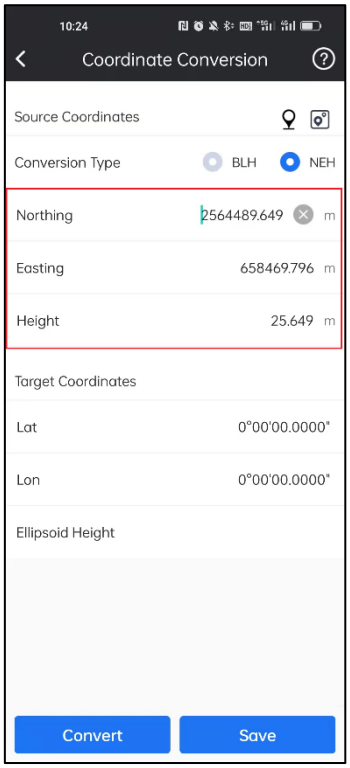
By clicking this, we can convert coordinate from BLH to NEH or from NEH to BLH in the current project parameters. We need to select the Conversion Type firstly.



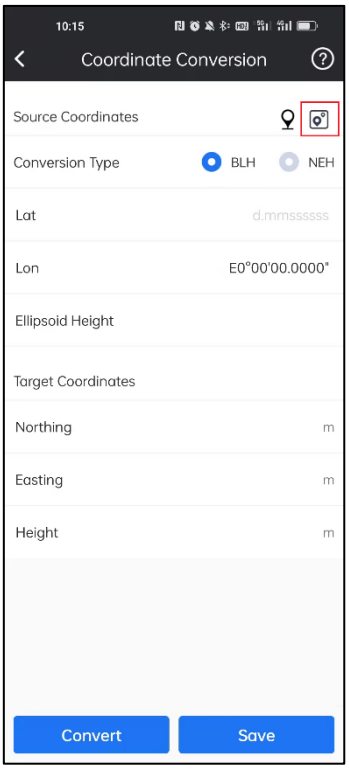


We can input coordinate directly.

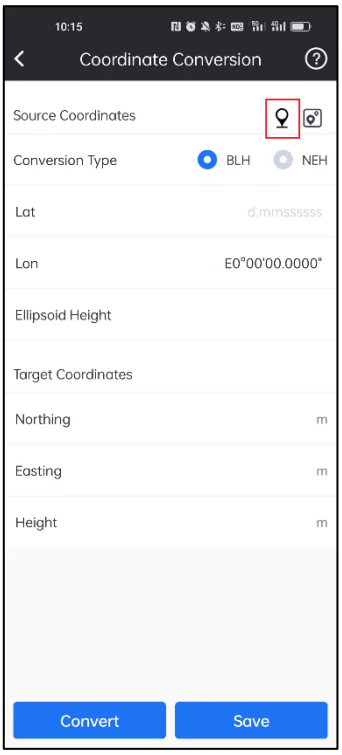




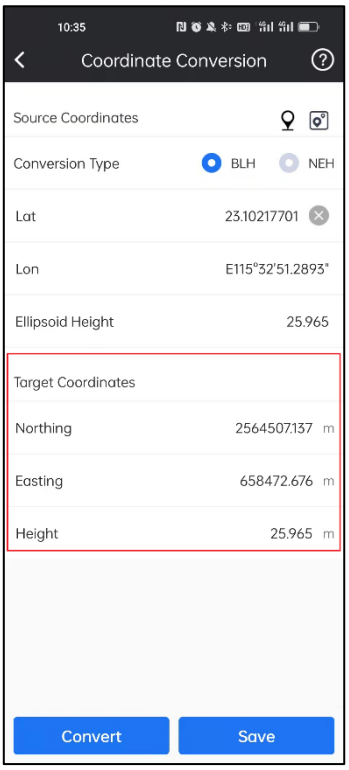
If we have the surveyed point in database, we can click the icon in the right of the Source Coordinates bar. And select a point. Click OK. Then the BLH or NEH will input automatically.

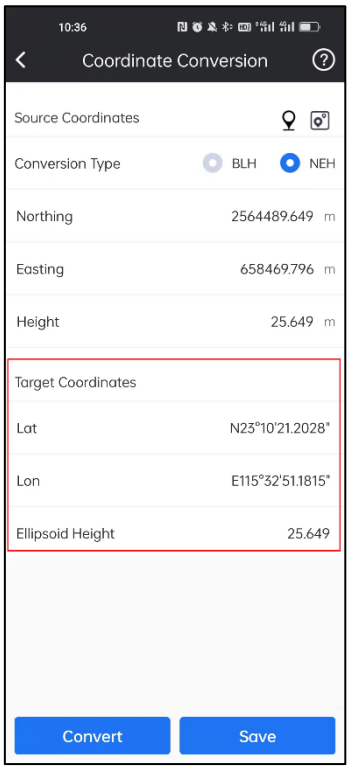


We can also put the device in the point and collect the coordinate in site. Click the icon in the right of the Source Coordinates bar. And click OK to collect it.

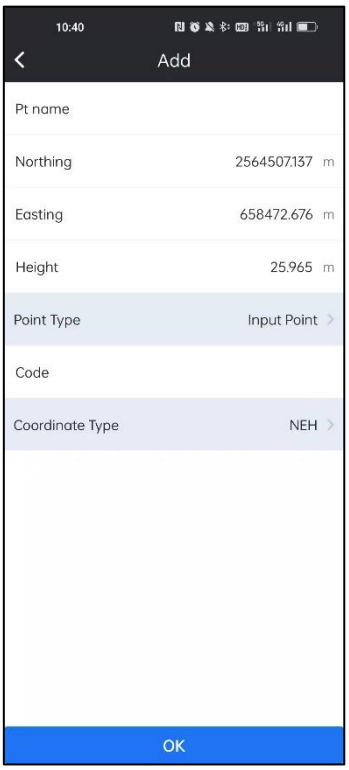


Click Convert and the target coordinates will be calculated and shown in the below bars.



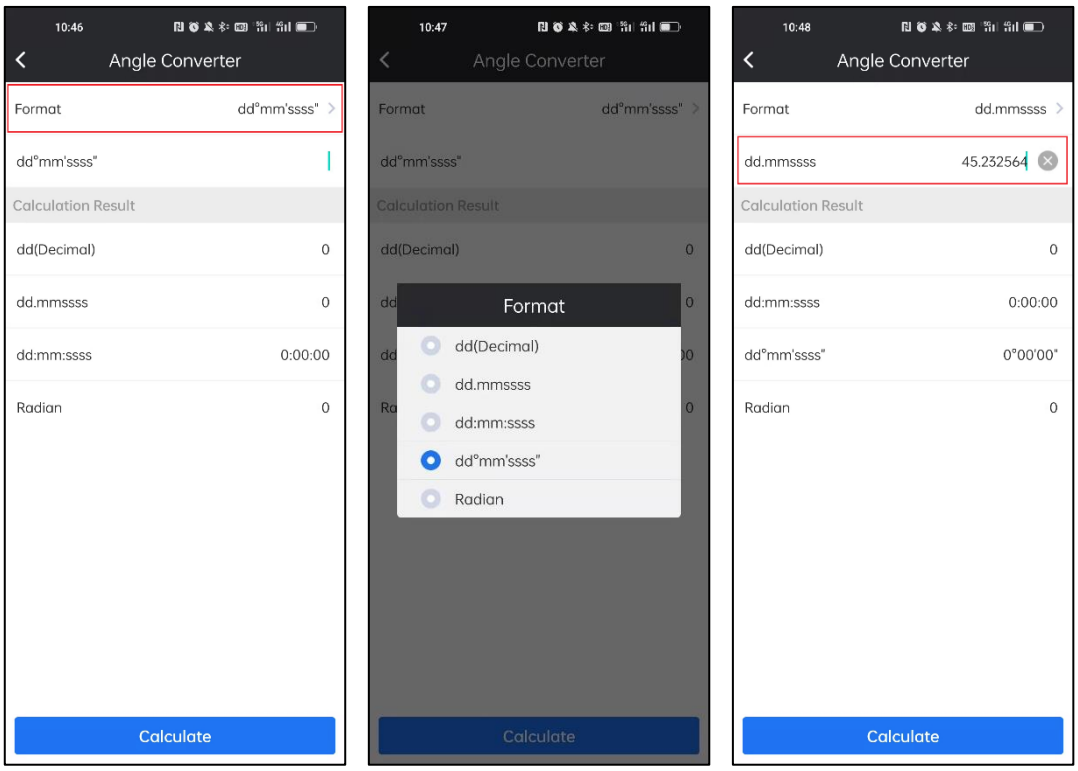


We can click Save to add the calculated coordinate to the point database.



6-3 Angle Converter

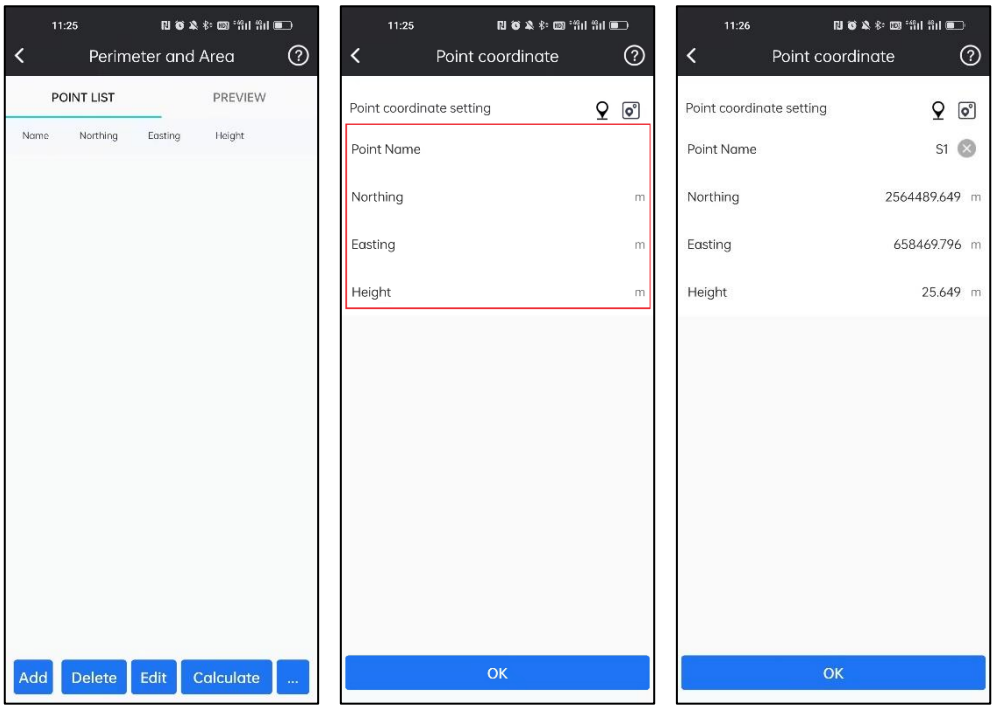
We can convert the angle format in this function. Select the input format and input the angle.



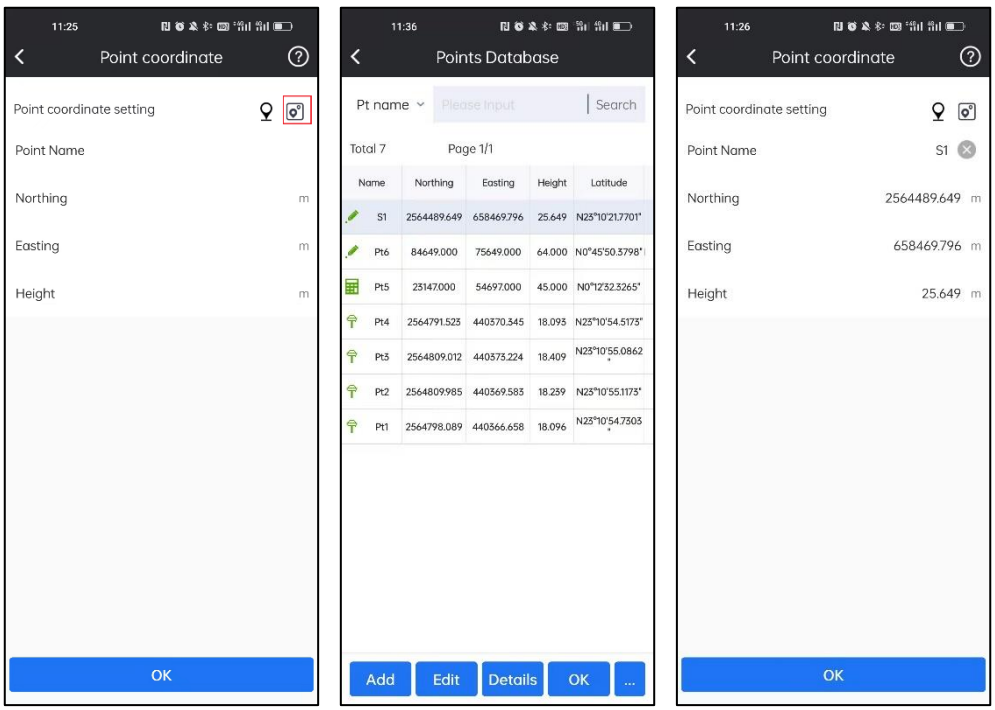
Click Calculate. Then it will be converted to other formats.

6-4 Perimeter and Area

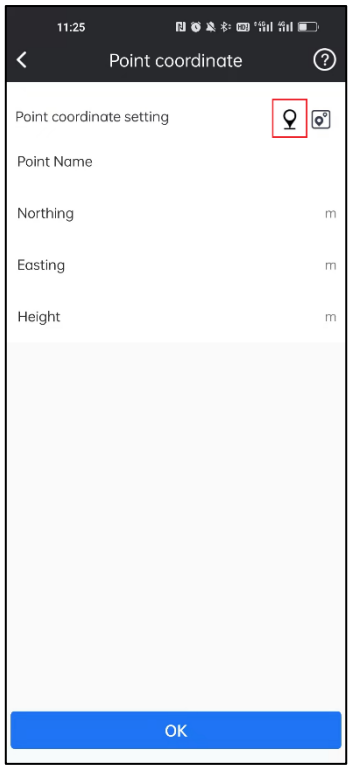
We can use the coordinate of the points to calculate the perimeter and area. Click Add. We can input the point directly.



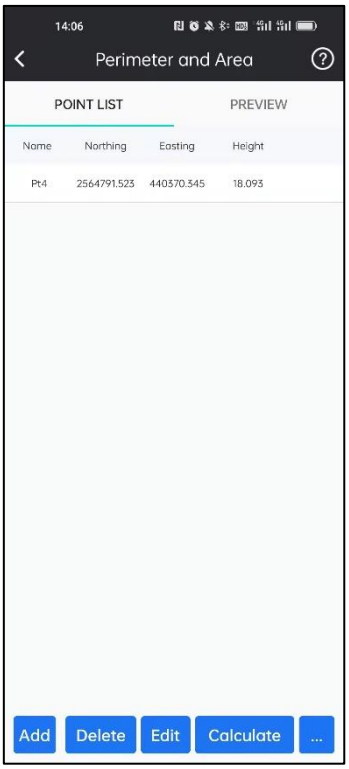
If we have the surveyed point in database, we can click the icon in the right of the Point coordinate setting bar. And select a point. Click OK. Then the NEH will input automatically.



We can also put the device in the point and collect the coordinate in site. Click the icon in the right of the Point coordinate setting bar. And click OK to collect it.

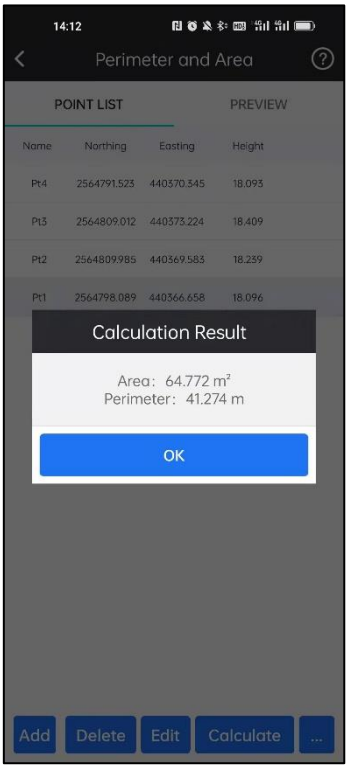


Click OK. And the point will add to point list.

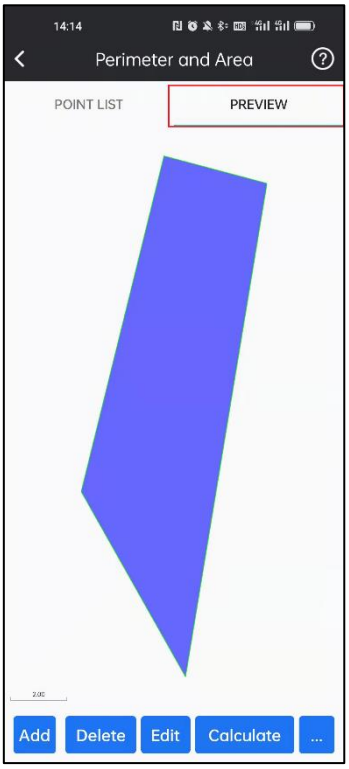


We can delete or edit a point after selecting it and then click Delete or Edit.

When we finished the input of the points, then we click Calculate and there will show the result of perimeter and area.

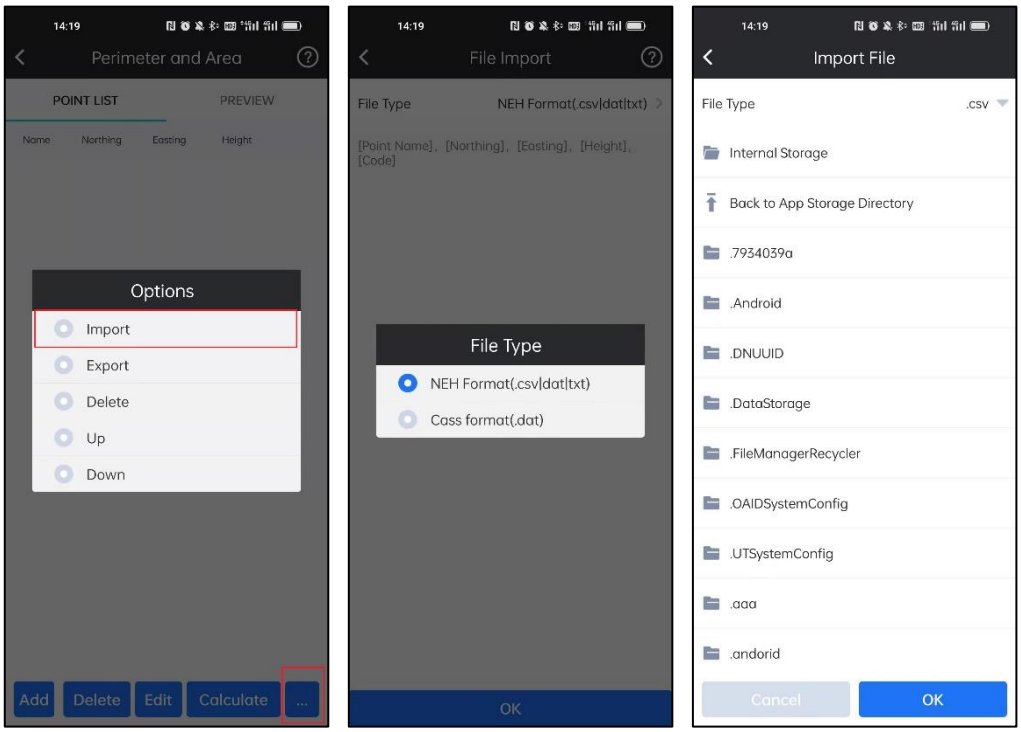


We can check the shape of the polygon by click the PREVIEW.



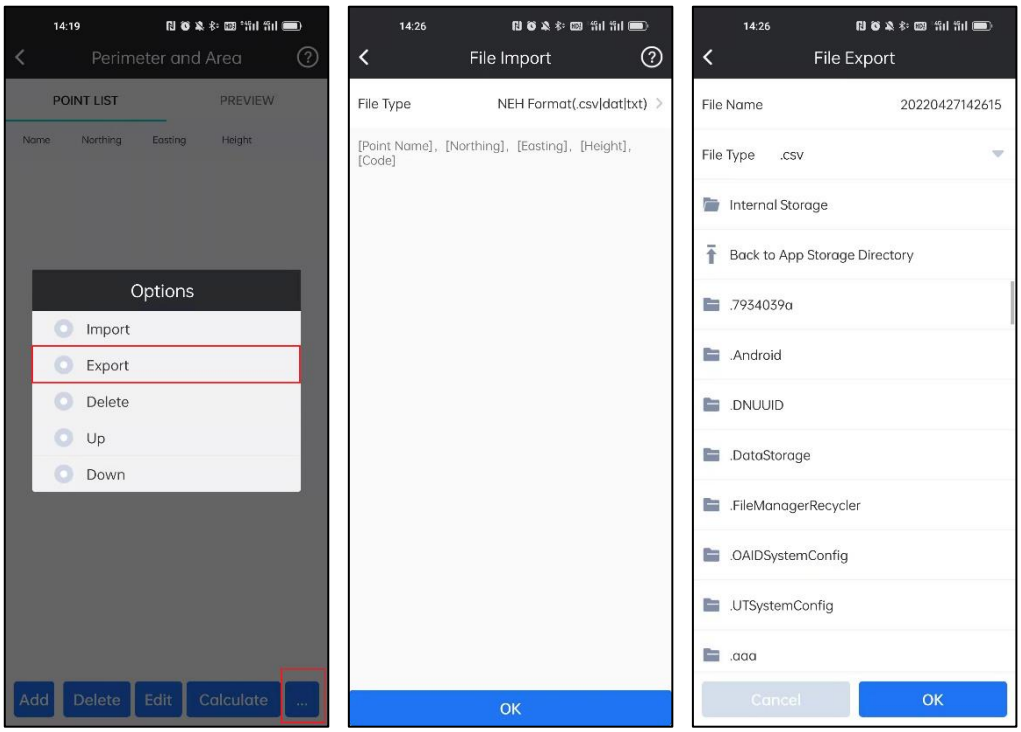
Import:

Click […] and Click [Import]. Select the file type: NEH Format(*.csv|dat|txt) or Cass Format(*.dat). Click [OK]. Select file path and click the file. Click [OK].



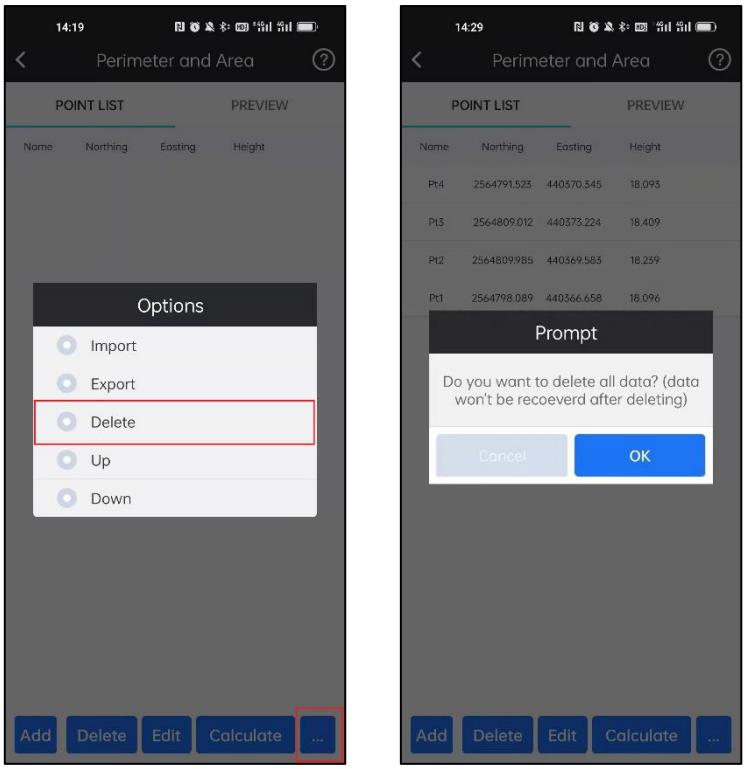
Export:

Click […] and Click [Export]. Select the file type: NEH Format(*.csv|dat|txt) or Cass Format(*.dat). Click [OK]. Select file path. Click [OK].



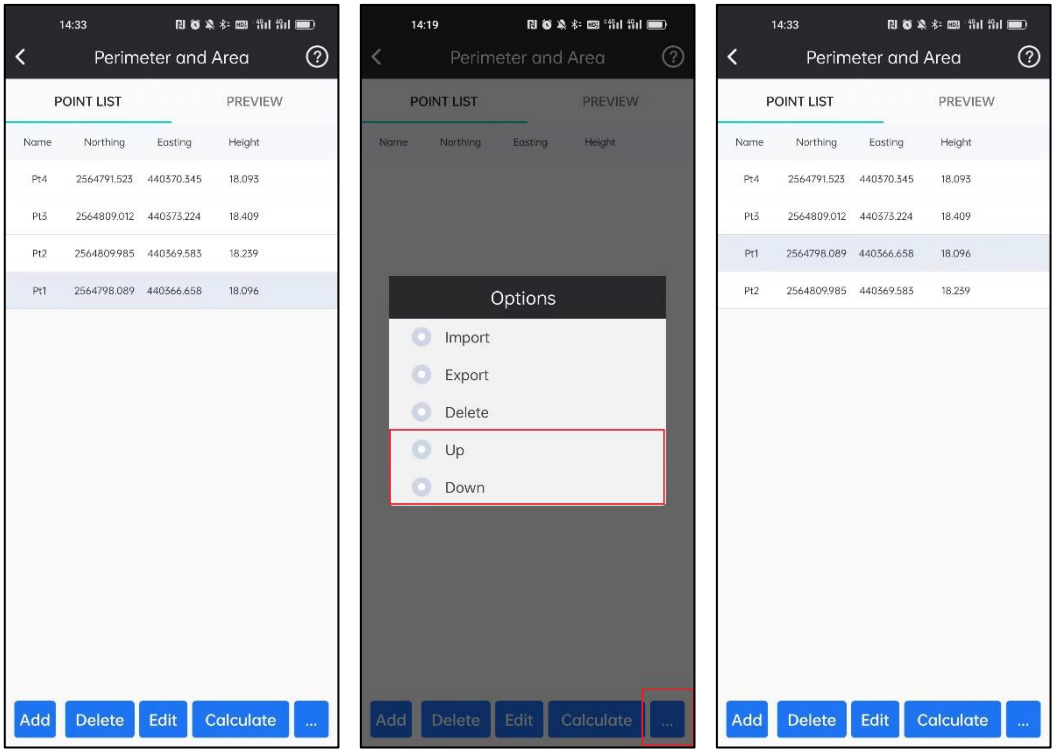
Delete all data:

Click […] and Click [Delete]. Click [OK].



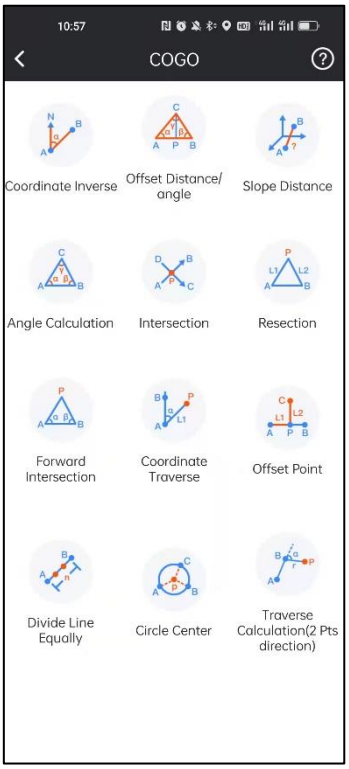
Up/Down Point:

Select a point, click […] and Click [Up]/[Down]. Then the selected point will move up/down.



6-5 COGO

Click COGO to enter to this page. According to the known coordinates, it can figure out position relations between point and point as well as between point and line. It includes Coordinate inverse calculation, Point line calculation, Vector, Two Lines Angle and other calculation, which will be introduced in the following.



The following three icons in COGO Calculation mean:

: Collect current coordinate.

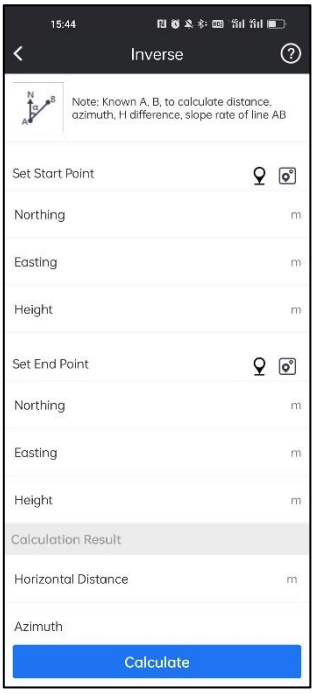
: Points Database.

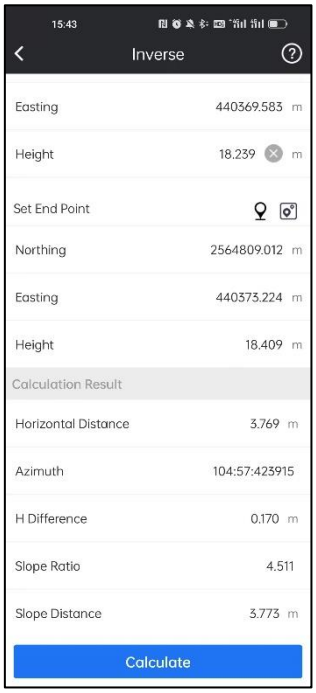
There are three ways to set points: 1. Extract coordinates from Points Database; 2. Collect current GPS coordinates; 3. directly input values of Northing, Easting and Elevation.

Calculation result in COGO calculation can be stored in Points Database with Click Save.

6-5-1 Coordinate Inverse

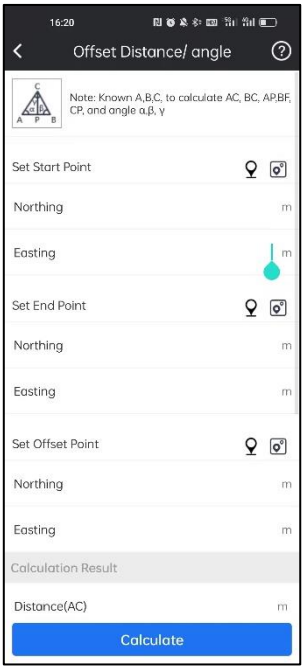
Set Start Point A and End Point B, and click Calculate to calculate the Horizontal Distance, Azimuth, H Difference, Slope Ratio and Slope Distance.

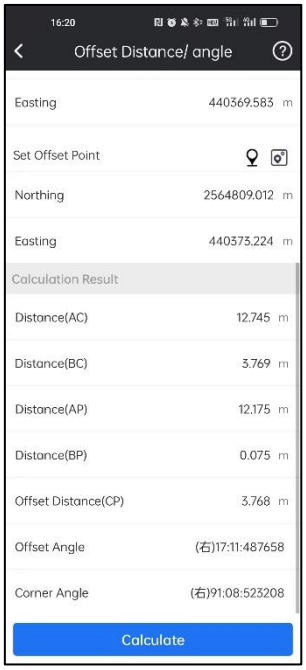




6-5-2 Offset Distance/Angle

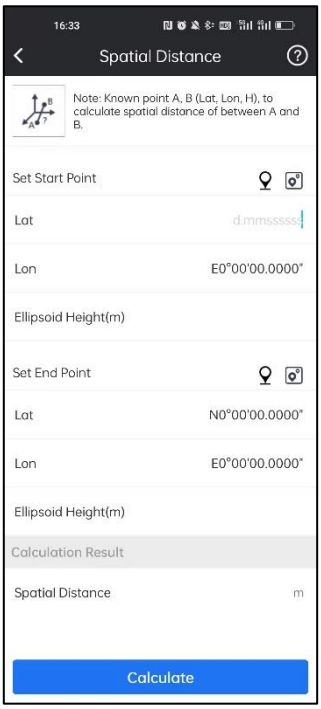
Set Start Point A, End Point B and Offset Point C, and then click Calculate to calculate the Distance(AC), Distance(BC), Distance(AP), Distance(BP), Offset Distance(CP), Offset Angle and Corner Angle.

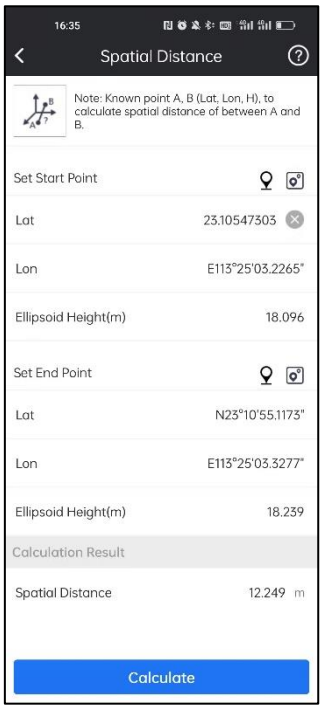




6-5-3 Slope Distance

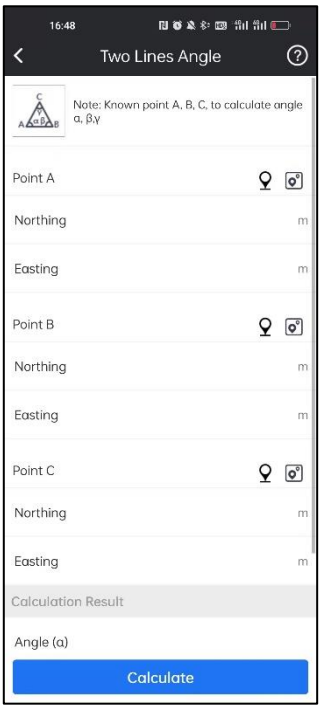
Set Start Point A and End Point B, and then click Calculate to calculate the Spatial Distance.

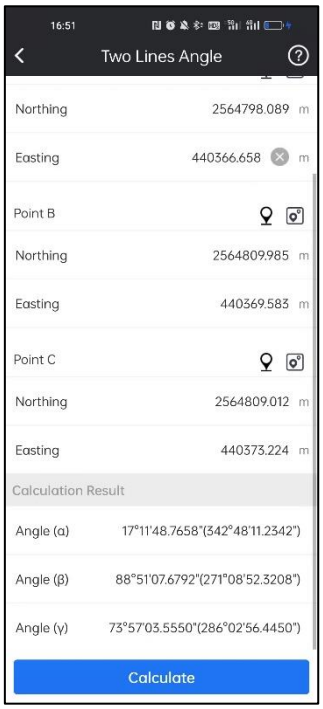




6-5-4 Angle Calculation

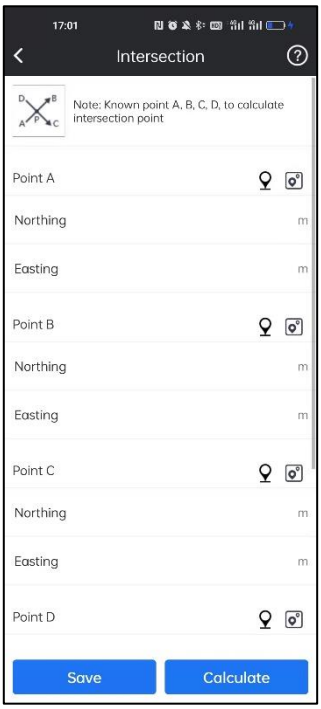
Set Point A, Point B and Point C, and then click Calculate to calculate the Angle ABC, BAC and ACB.

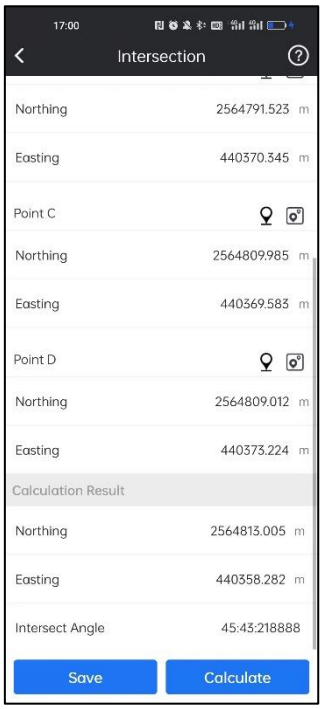




6-5-5 Intersection

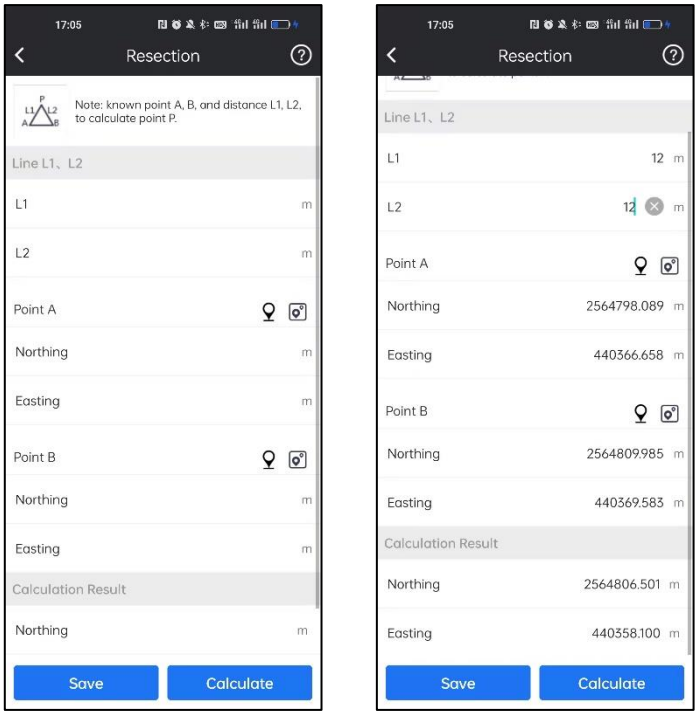
Set Point A, Point B, Point C and Point D, and then press Calculate to calculate the intersection coordinates and intersect angle.





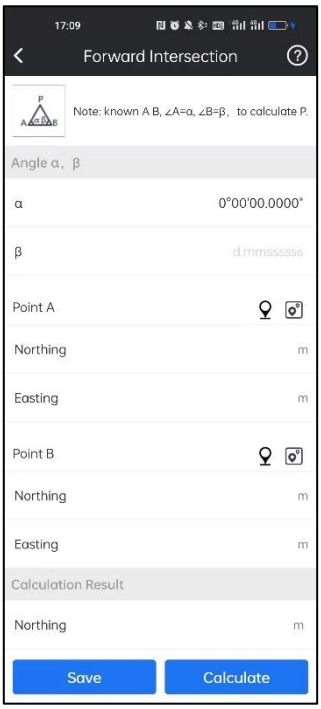
6-5-6 Resection

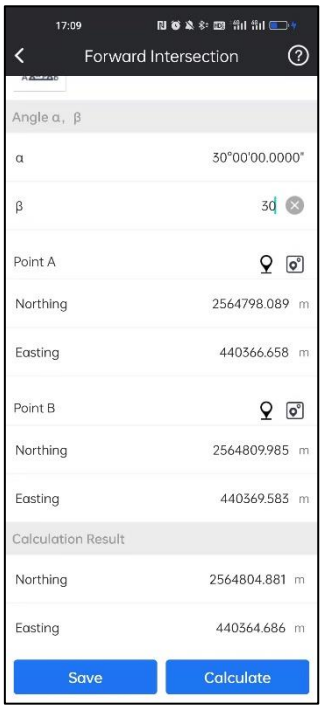
Set Line L1, L2, Point A and Point B, and then click Calculate to calculate the point coordinates.



6-5-7 Forward Intersection

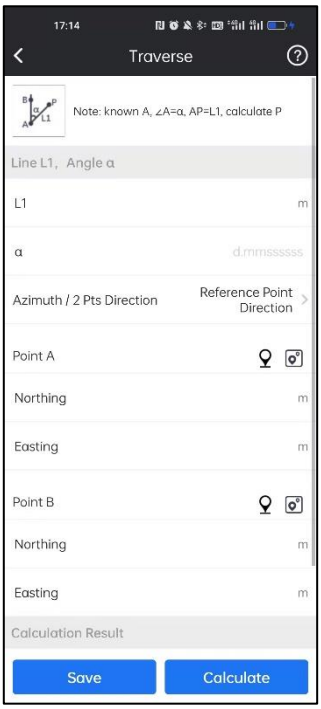
Set Angle α, β, Point A and Point B, and then click Calculate to calculate the point coordinates.

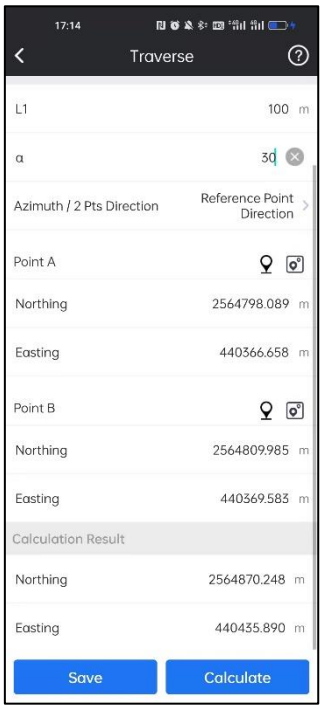




6-5-8 Coordinate Traverse

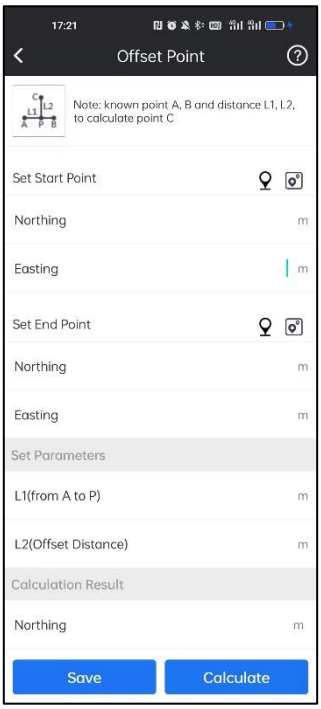
Set Line L1, Angle α, Point A and Point B, and then click Calculate to calculate the point coordinates.

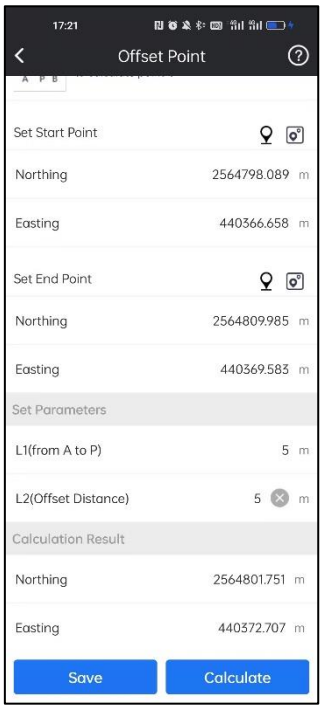




6-5-9 Offset Point

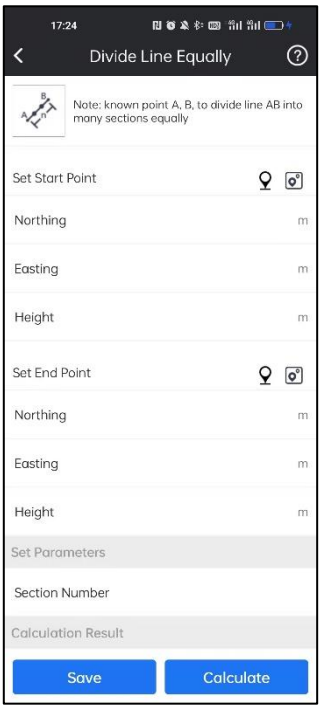
Set Start Point A, End Points B, Line L1(from A to P), Line L2(Offset Distance), and then click Calculate to calculate the point coordinates.

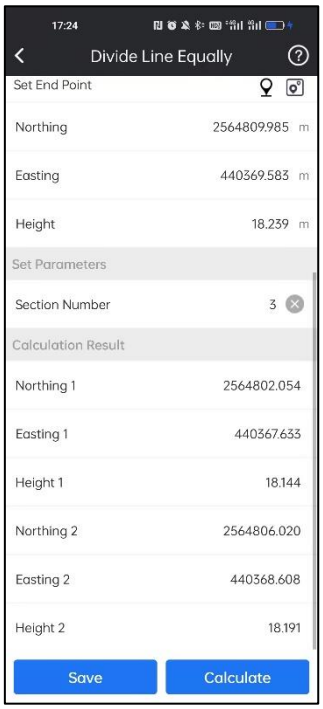




6-5-10 Divide Line Equally

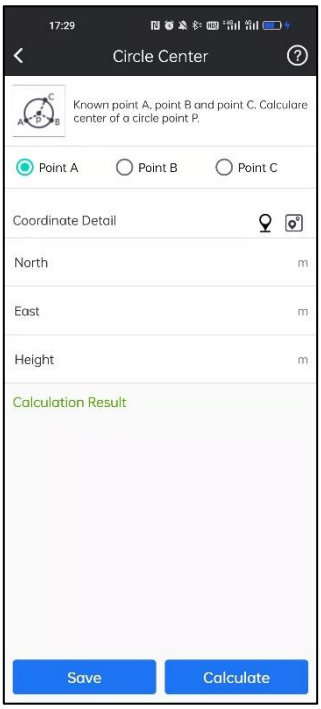
Set Start Point A, End Point B, and Section Number, and then click Calculation to calculate n-1 coordinates.

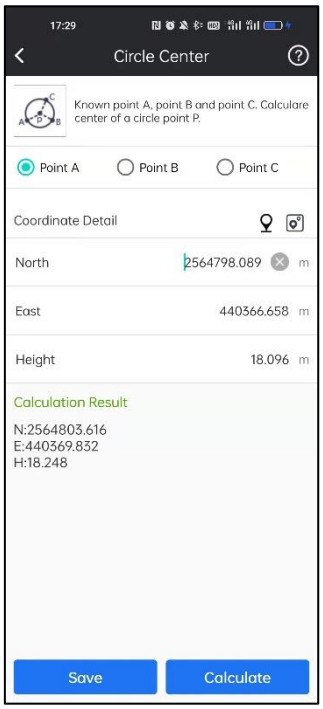




6-5-11 Circle Center

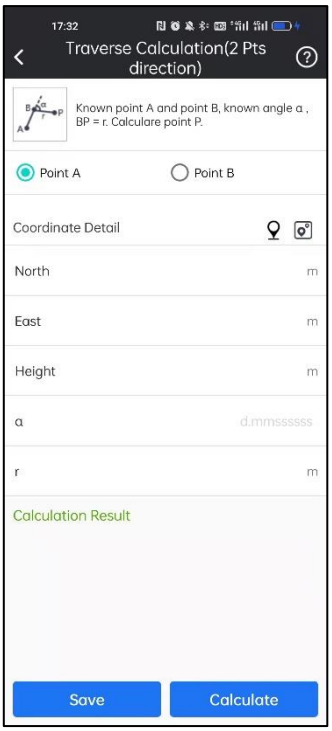
Set Point A, Point B, and Point C, and then click Calculation to calculate the center of a circle point coordinates.

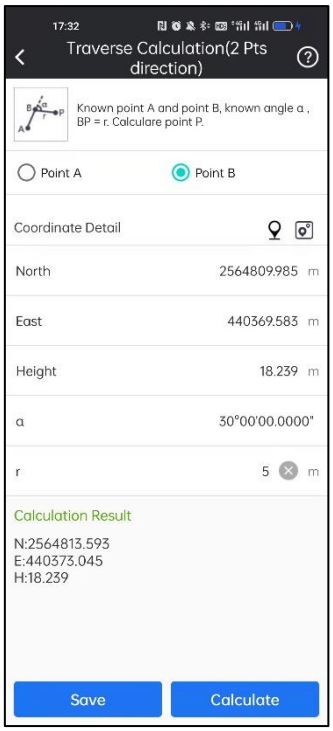




6-5-12 Traverse Calculation(2 Pts direction)

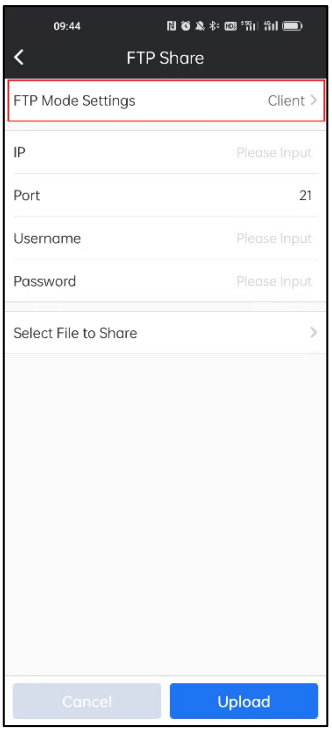
Set Point A, Point B, Angle α and Line r, and then click Calculation to calculate the point coordinates.

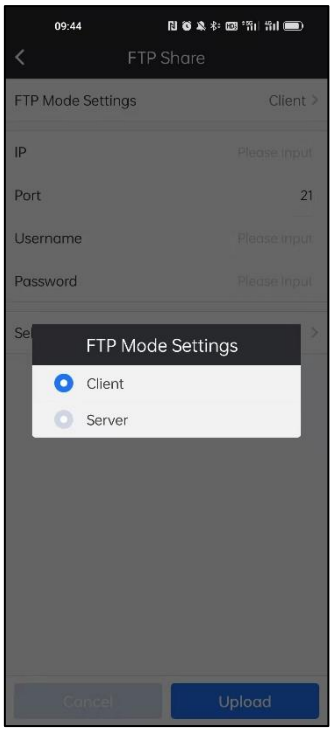




6-6 FTP Share

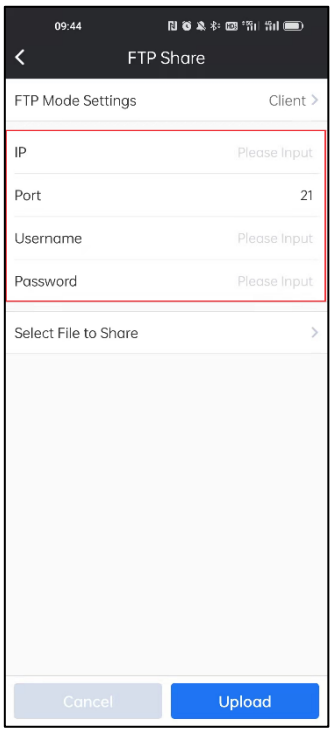
By clicking this, we can share the file with FTP. Select the FTP Mode Settings: Client or Server.



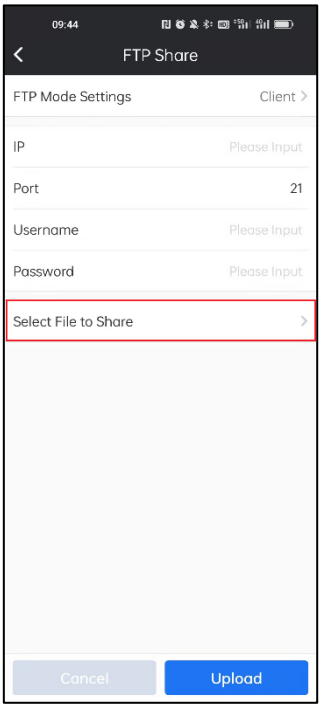


Client:

To use this mode, we need to have a server. And input IP, Port, Username and Password.

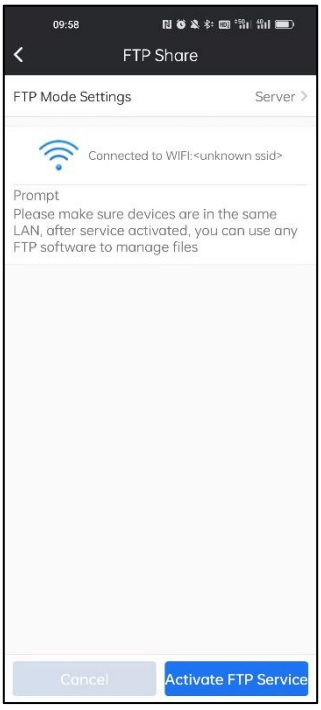


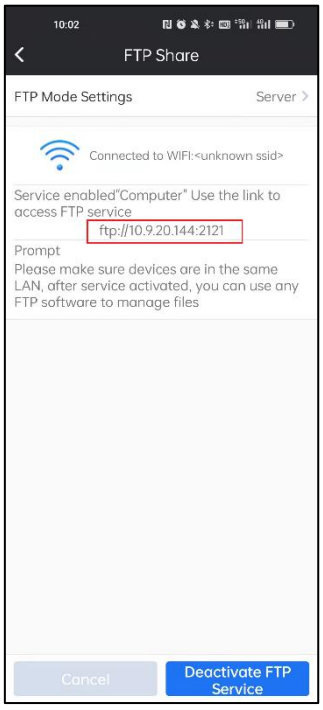
Then click Select File to Share, Select the shared file and click Upload, then the file will upload to the server.



Server:

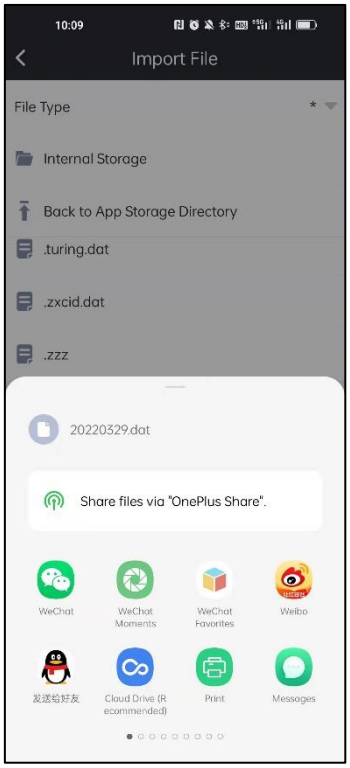
Select Server mode. We need to connect the same WIFI with the other device such as PC or smart phone. Then click Activate FTP Service. Then we can input the address shown in the page. And then we can transfer files with FTP. If we want to close it, we can click Deactivate FTP Service.





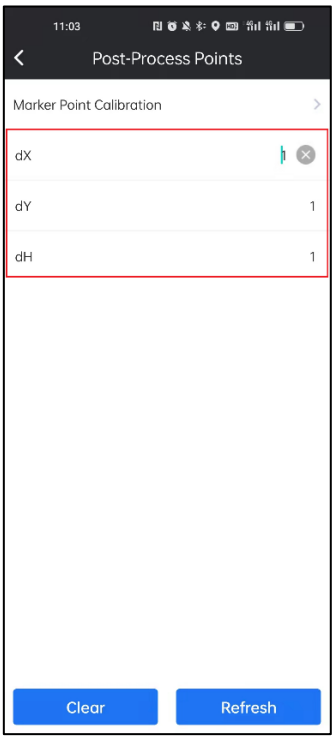
6-7 File Share

By clicking this, we can share the data file to the other app or the other device. Select the shared file and click OK, then we can share the selected file.

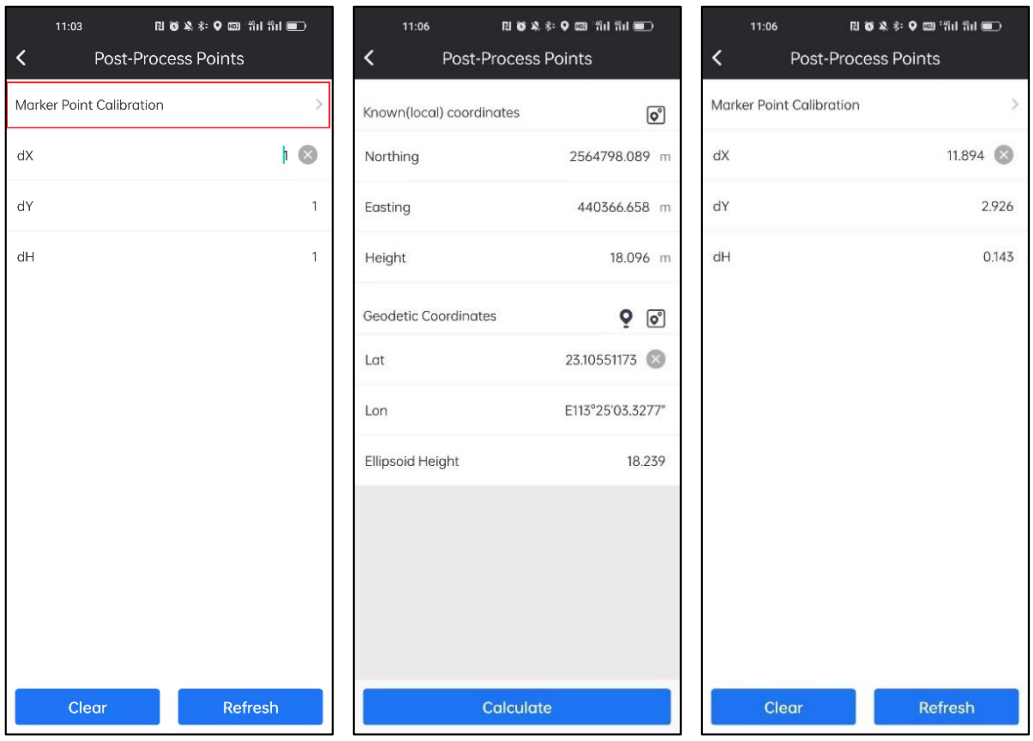


6-8 Post-Process Points

By clicking this, we can calibrate the data collected without site calibration and after collection the data needs to calibrate data of a certain period. If we know the offset parameters, we can input directly.



We can also click Marker Point Calibration to calculate the offset parameters.



Then click Refresh, select the time period to be corrected, click Refresh. Then select the Starting Time and the Ended Time, then the surveyed point in that period will be refreshed.